

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXXII: No. 19.

New York, Thursday, November 8, 1883.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

Cutting-Off Saw and Gaining Machine.

We present in the accompanying engravings two different views of a new machine now being manufactured by Messrs. C. B. Rogers & Co., of No. 109 Liberty street, New York City, their manufactory being at Norwich, Conn. The machine combines a gainer and heavy timber cutting-off saw for railroad, car and bridge work. The saw carriage travels on ways on a strong and substantial arm, as shown, which is attached to an upright column and gibbed to it. It is raised and lowered by means of screws to accommodate saws of different sizes, and also to regulate the depths of the gains when the gainer-head is being used, as in Fig. 2. The apparatus is provided with a novel automatic device for taking up the belt by the traverse of the saw carriage, which is carried forward and backward by a screw feed driven by power and keeping the tension of the belt the same at all points. The saw and gainer-head work over the top of the lumber, and cut back from the operator, and are less liable to accident, as all loose pieces will go backward. The stuff does not need holding on the table when sawing, as the cutting of saw draws it to the fence blocks on the table. The timber should be keyed when gaining, in order to move it accurately to the lines, by means of the hand-wheel on the table. When the machine is wanted to gain wide stuff, the table is moved back on the base by means of rack and pinion and the hand-wheel on the side of the base box. When sawing, the table should be locked by the bolt on the front of the table to prevent its being moved endways, so the saw will not pass in the groove in the table. The machine will carry a saw from 18 inches to 34 inches, and 14-inch gainer-head. All parts are mounted upon a substantial base, so that in moving the machine none of its parts are displaced. It is provided with a counter-shaft, with tight and loose pulleys, 8 inch x 14 inch, and should make 365 revolutions per minute. The weight of the machine is 4500 pounds.

Metallurgy in Sweden.

Mr. P. W. Moen, of Worcester, Mass., in an interesting paper on the above subject, gives some particulars which, aside from their value as giving an idea of the mineral wealth of Sweden, are of considerable historical interest. According to Mr. Moen, the extensive forests of fir, spruce and pine, and the practically inexhaustible depots of various ores, constitute the natural wealth of the country. Not all parts, however, are equally blessed in the distribution of this wealth. If we except the coal-bearing fields of Skane, in the south—the only coal fields yet known in Sweden—the mountain of titaniferous ore at Taberg, near the lower end of Lake Wettern, the productive copper mines of Atvidaberg, and a small number of widely-scattered mines, principally of iron ore, the mass of mines of all kinds lies closely together, north of the latitude of Stockholm, comprised within a district of not more than 100 miles in extent from north to south, nor more than 150 miles from east to west. Several provinces of the south are nearly as free from forests as some of our Western States, but, beginning also with the latitude of Stockholm, they reach co-extensive with the breadth of the country itself northward to the Arctic circle. It is mostly along the banks of the countless rivers which run in parallel courses from the Norwegian mountains and empty into the northern part of the Gulf of Bothnia that the enormous quantities of timber are cut which supply the constantly increasing demand of England and of France. Mining has been followed in Sweden from very early days. The oldest mining town in Sweden is Falun, the capital of the historic Province of Dalecarlia, situated about a day's journey by rail to the north and west of Stockholm. It is impossible to say when the famous copper mine there was discovered. There are those who maintain that the bronze ornaments of Solomon's glorious temple were made of copper taken from this mine. Antiquarians assert that the ores have not been worked for more than 2000 years. In those days mining was carried on not by a company, but by many independent owners called "bergsmannen," each of whom had his own corps of men engaged in breaking out the ore and carrying it to his smelting furnaces, perhaps many miles away, as the copper slags found far from the mine itself show. The ore was richer then than now. It lay in abundance near the surface. The appliances were not such as to enable them to go to any great depth. When one vein proved unproductive or lay too deep a new vein was taken or work begun in fresh spots on the old vein. Many a man's fortune was made by finding a deposit of pure or nearly pure ore. They still tell in Falun of one bergsmannen who was so rich that he shod his horses with silver, and of another living in an adjacent parish in which the church was built upon a hill so hard to climb, by reason of its roughness, that the magistrate offered to cover the hill with plates of copper. It was then no difficult matter to smelt the ores with wood or charcoal in a small furnace, not unlike the modern blast furnace, save in height and in the details of its construction, and to obtain a rich return, though there was left in the slag more copper than is now found in the ores

from the same mine. This dry process, so called, has been followed until within about a couple of years, when the last furnace of the three or four of a kind in Falun was abandoned. To return to the early history of the mine. It is known that it was worked

afterward lay idle for several years. In 1720 the shares in the mine were divided in 1200 parts, and as many as 60 or 70 small furnaces were engaged in smelting the ores. One large company now control the entire working of the mine, and they continue in the same direction until

laid off at present. Taking any one of the lateral passages as a base line, the miners break out ore to right and left, and above to a distance of several feet, following, of course, the vein or dip of the deposit, and they continue in the same direction until

the roof and sides are supported by strong timbers, but as soon as all the ore has been broken out the timber is removed, and barren rock is filled into the space, thus providing at once a use for worthless stone and a security against the possibility of caving in. The water is removed from the mine by the simplest of wooden pumps, which work day and night. The water is raised a few feet, runs out through a trough, and then is pumped a few feet higher, and so to daylight. A little wheel, driven by the water thus pumped, is made to sound the bell at the wheel-house some distance away, and an interruption in the ringing of the bell signifies that, for some reason, the pumps are not working. The oldest method employed to free the mine from water was by simply passing it up in buckets by hand, and it was not before the beginning of the sixteenth century that any method of employing power was introduced anywhere into Sweden. At that time a kind of paternoster work, originating in the Joachimsthal, Germany, was used, and about the middle of that century the present system of communicating power by beams, joined end to end, and alternately ascending and descending, came in vogue. In order to break out the ore or to drive passages, firewood in long sticks was laid on the rock, ignited and allowed to burn until the wood was consumed. Then the rock, either by cooling itself or by being cooled with water, cracked and fell, or was easily broken out. This practice was not only costly, but tedious and dangerous. The use of powder was not begun at Freiburg, in Saxony, until 1613. In 1644 it was in general use at Freiberg and at Clausthal in the Harz, and in 1670 in England. But in Falun it did not come into use before 1720, although this mine was not the first to try it. The holes made were then so large and the charges of powder so heroic that harm was done to the mine, and so much that the authorities once forbade its employment, though they soon withdrew their objections. The boring is now carried on by hand principally, but in 1879 compressed air was used experimentally with good results. Both dynamite and powder are used as explosives.

THE ORES.

The principal ore mined at Falun is copper pyrites (chalcopyrite). It occurs in rock composed mainly of quartz, chlorite and hornblend. Chalcocite occurs also in great quantities, sometimes along with the copper pyrites, and sometimes alone. Much galenite and a little zincblende are also found in varying quantities in different parts of the mine. Gold, also, in minute quantities, $100 \text{ g} \text{ per ton}$ being the highest per cent. Within two or three months a very respectable find has been made of native gold in a true quartz fissure. How far this deposit may continue is uncertain. The mine is rich in many minerals valued by the possessors of cabinets; among the most remarkable are garnets the size of a man's head. When the ore has been raised to the surface it is broken by hand, sorted or sifted, like coal, and the ore containing 10 to 12 per cent. of copper, preferably, but even down to as low as 1½ to 2 per cent., is subjected to the so-called wet process. It must first be calcined or roasted to free it as far as may be from sulphur. This is done in kilns cut into the hillside and walled with brick or stone at the back and sides. The top and front are open. The cavities are about 30 feet long, and the top angle of the sides inclines about 1 foot in 10. If much chalcocite is to be calcined, or the proportion of chalcocite to chalcopyrite exceeds one-half of two-thirds, wood has to be used, otherwise the sulphur itself furnishes the requisite fuel. Fifteen hundred to two thousand hundredweight of the ore is placed in alternate layers from the bottom up, with brush or split wood to insure a sufficient draft. When the kiln is full, the mass is covered tightly with earth. At the back of the kilns, near the top, are holes opening into walled canals, through which the sulphurous fumes pass and are condensed in a large wooden building. The powder so obtained is afterward made into pure sulphur by being refined in kettles. The calcining continues from seven to eight weeks, and must not go too hastily. The odor of sulphur is very perceptible not only in the vicinity of the mine, but at quite a distance from it. No green thing grows near the mine. In fact, the country thereabout has every appearance of having been swept by fire and water. The trees in the town are stunted and grow very slowly. The buildings are dingy and ancient looking. But the town is very healthy. No plague has ever visited it, and in times of pestilence it has often been the asylum of the court. The roasted ore is first crushed to powder, sifted and mixed with common salt, then moistened with a weak solution of sulphuric acid and allowed to stand some time to permit the acid to work. It is then oxidized in a gas furnace, whereby the copper is rendered soluble. This is done in large wooden tanks with false bottoms that serve to filter the liquid. Dilute acid, generally that which has been used before, is first introduced over the ore, then stronger acid. The solution is drawn off and precipitated by iron. Scrap iron is the ordinary material, as being cheaper and better than pig iron, and it is used over and over again until no longer serviceable. The precipitated copper is afterward refined in furnaces burning gas made from sawdust and wood. Besides copper, the products, direct and in-

Fig. 1.—Side View of Machine with Saw Attached.

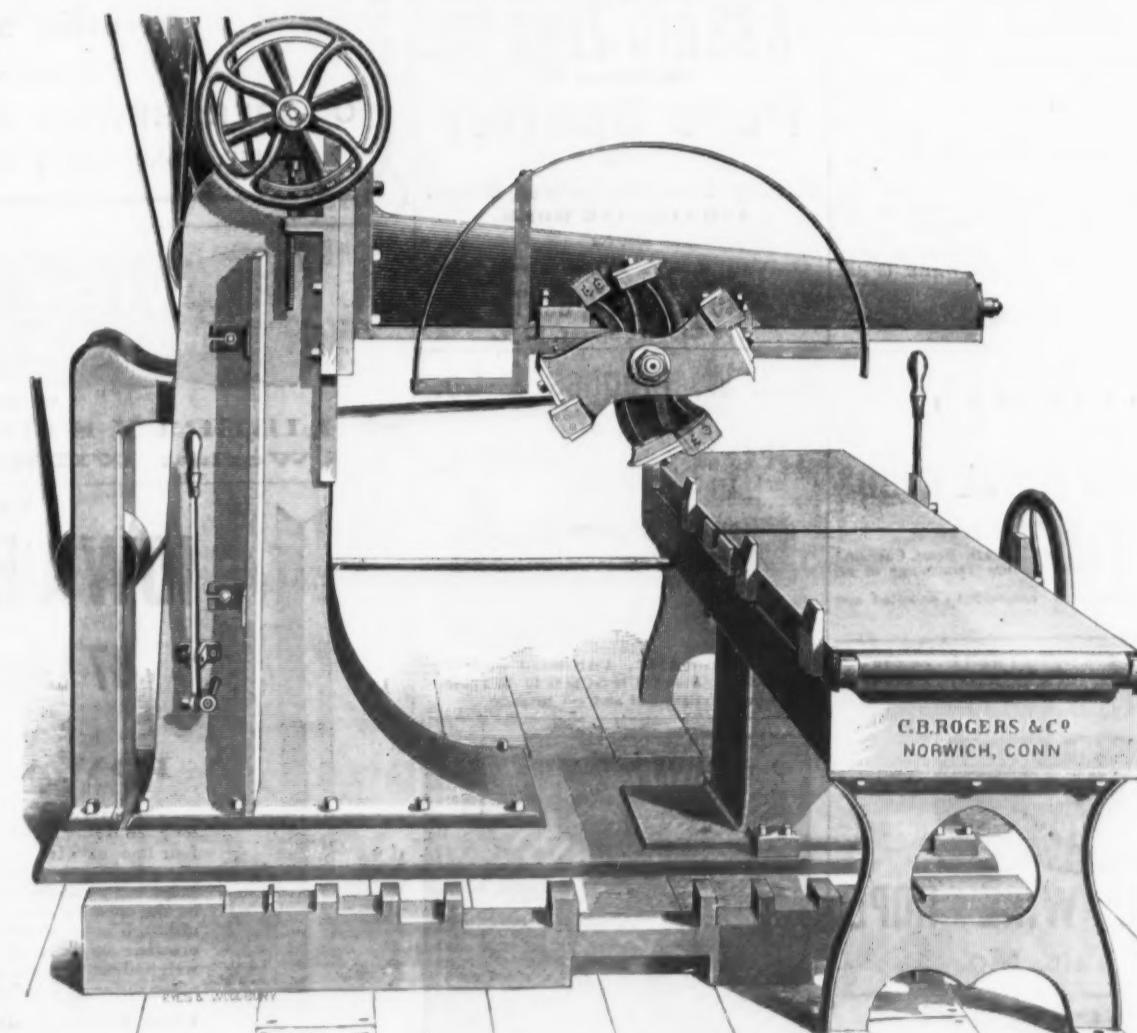


Fig. 2.—Side View Showing Application of Gainer.

CUTTING-OFF SAW AND GAINING MACHINE, BUILT BY C. B. ROGERS & CO., NORWICH, CONN.

in 1280. In 1347 it passed into the hands of the Crown, and there is still preserved a grant of privileges given by King Magnus II (Smek) in the year just mentioned. The sinking of so many shafts by independent bergsmannen finally went so far that in 1647 the ground, fairly honeycombed, gave way, leaving a yawning gulf 1200 feet long, 660 feet wide and 300 feet in depth. The mine

Shafts have been sunk in several places about the pit. The deepest shaft is now sunk somewhat over 1000 feet below the surface. The miners work on two or three levels. Lateral passages extend in several directions from the bottom of the shaft, and through them pass the lines of tramways on which the ore is conveyed to the shaft, whence it is hoisted by water power to the surface. While a line is being worked on any level

barren rock is encountered or the working emerges into some other passage. Where the work is being carried on in the higher levels the ore is conveyed to a chute, down which it falls to the lowest level, and by the opening of the trap it is let into the cars waiting to carry it to the shaft, whence it is hoisted by water power to the surface. Besides copper, the products, direct and in-

(Continued on Page 5.)

**ANSONIA
BRASS & COPPER CO.,**
No. 19 Cliff Street,
 Phelps Building, NEW YORK,

Manufacturers of

BRASS AND COPPER

IN

Sheets, Bolts, Rods, Wire, &c.
**Seamless Brass & Copper
Tubing.**

Ansonia Corrugated Stove Platforms.
PURE COPPER WIRE
Electrical Purposes, Bare and Covered.
Phosphor Bronze Rods for Pumps, &c.

**ANSONIA ★ REFINED
INCOT COPPER.**

PHELPS, DODGE & CO.,
Importers of

TIN PLATE, ROOFING PLATE,

Sheet Iron Copper, Pig Tin, Wire,
Zinc, &c.

Manufacturers of

COPPER AND BRASS.
CLIFF STREET, NEW YORK.

SCOVILL MFG CO

BRASS,

Hinges Wire, German Silver.

Photographic Goods.

BUTTONS,

Cloth and Metal.

Depots, Waterbury, Conn.
177 Devonshire St., Boston.
183 Lake St., Chicago.

Factories, New Haven, Conn.
New York City.

DICKERSON, VAN DUSEN & CO.,

Importers of

Tin Plate, Pig Tin, Sheet Iron, Copper,
Wire, Zinc, Etc.

29 & 31 Cliff St., cor. Fulton,
DICKERSON & CO., Liverpool. NEW YORK.

**THE NEW HAVEN
COPPER CO.,**

Sole Makers of

POLISHED COPPER

Under Patent of T. James, Sept. 12, 1876.

Also Manufacturers and
Dealers in

BRAZERS & SHEATHING COPPER.

Kettles, Bottoms, Bolts, Circles, &c.

290 Pearl Street - NEW YORK.

A. C. NORTHROP,

Waterbury, Conn.

NOVELTIES IN BRASS AND OTHER METAL GOODS

FOR HARDWARE TRADE.

Wrought Iron and Brass Machine Screws; Turned, Hexagon, Round and Square Head Cap and Set Screws; Brass and Iron Safety and Jack Chain; Gilt, Nickel Plated and Bronze Trimmings of all kinds, from Sheet Iron, Steel or Brass.

Estimates on patented articles, or any description of Sheet Metal work, respectfully solicited and promptly given.

BRODERICK & BASCOM ROPE CO.,

Manufacturers of

WIRE ROPE

BRODERICK & BASCOM ROPE CO.

IRON WIRE ROPE, STEEL WIRE ROPE.
728 N. Main St., St. Louis, Mo.

WORCESTER WIRE CO.,

Manufacturers of

IRON AND STEEL WIRE

For all Purposes.

WORCESTER, MASS.



Waterbury Brass Co.

CAPITAL, \$400,000.

Sheet, Roll and Platers' Brass,

GERMAN SILVER,

Copper, Brass and German Silver Wire,

BRASS AND COPPER TUBING,

COPPER RIVETS AND BURS,

BRASS KETTLES,

Door Rail, Brass Tags,

PERCUSSION CAPS,

POWDER FLASKS,

Metallic Eyelets, Shot Pouches, Tape Measures, &c.

And small Brass Wares of every Description.

Cartridge Metal in Sheets or Shells a Specialty.

Soil Agents for the

Capewell Mfg. Co.'s Line of Sport-

ing Goods.

DEPOTS, Mills At
296 Broadway, New York, WATERBURY,
125 Eddy St., Providence, R. I. Conn.

Bridgeport Brass Co.,

The Plume & Atwood
Mfg. Company,

Manufacturers of

SHEET and ROLL BRASS and WIRE,

German Silver and Gilding Metal,

Copper Rivets and Burs,

Copper Electrical Wire, Pins,

Brass Butt Hinges,

Jack Chain,

Kerosene Burners,

Lamp Trimmings, &c.

18 Murray Street, New York.

13 Federal Street, Boston.

109 Lake Street, Chicago.

Rolling Mill, Factories,

THOMASTON, CT. | WATERBURY, CT.

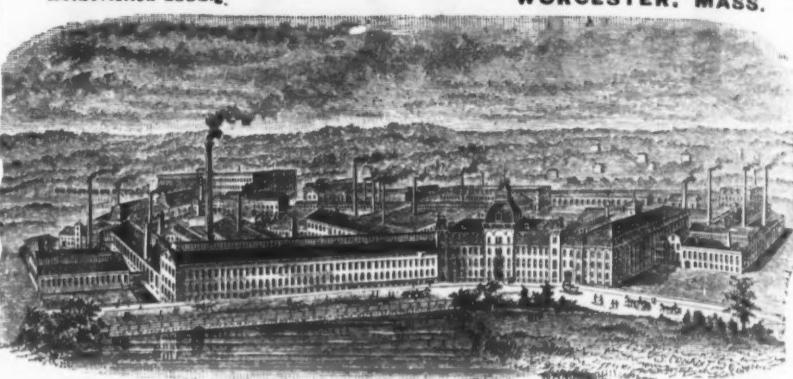
PHILIP L. MOEN, President and Treasurer.

CHAR. F. WASHBURN, Vice President & Secretary.

WASHBURN & MOEN MANUFACTURING CO.

Established 1831.

WORCESTER, MASS.



Manufacturers of

IRON and STEEL WIRE,

Patent Steel Barb Fencing, Patent Steel Wire Bale Ties.

WIRE HOSE of all grades, Bound from Rings, ranging in size, 10 to 14 in., cut to any length. Owners and exclusive Operators of the PATENT CONTINUOUS ROLLING MACHINE, producing Iron and Steel WIRE, it weighs 100 pounds, without AXLE or WHEEL. Patent Galvanized Telegraph Wire, Market and Store Wire, Annealed Fence and Grape Wire in long lengths; Coppered Pall-Ball Wire: Rope, Bridge, Bolt, Screw, Rivet, Bright and Chain Wire. Wire for the manufacture of Card Clothing, Heddles, Reeds, &c. Piano-string Covering Wire, Tinned Broom Wire and Tinned-plated Wire of all sizes. A specialty is made of Clock, Machinery, Gun Screw and Spring Wire, and other wire required for the manufacture of various articles. Wire of all kinds, including Norway Iron. Any grade of Wire furnished. Annealed, Bright, Polished, Coppered, Galvanized or Tin Plated. Wire furnished, Straightened and Cut to any length. Steel Crimpeline Wire, Patent Linen finish. Unrivaled Steel Music Wire. Steel Wire for Springs, Needles and Drills. Market Steel Wire kept in stock, all sizes.

WAREHOUSES: New York, 16 Cliff, and 241 Pearl Sts.

Chicago, 107 and 109 Lake Sts.



HOWARD & MORSE,

Warehouse:

45 Fulton Street,

NEW YORK,

Manufacturers of

Iron, Brass & Copper

WIRE CLOTH,

Plain and Ornamental Wire Work,

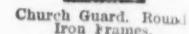
Wire Fence & Railing,

Door and Window Guards,

Office Railing,

also,

Iron Stable Fixtures.



PATENT LOOPED WIRES,

FOR TIES AND CAN OPENERS,

Cut any Length required, from six to twenty three inches.

TRENTON IRON CO.,

Trenton, New Jersey.

NEW YORK OFFICE:

COOPER, HEWITT & CO., 17 Burling Slip.

Philadelphia Office: 21 North Fourth Street.

WIRE ROPE

HAZARD MFG CO.

WAREROOMS:

87 LIBERTY STREET, NEW YORK.

Works: WILKESBARRE, PA.

This advertisement changed weekly.

IOWA BARB WIRE CO.

87 Liberty St., New York.

IOWA IRON POSTS.

These are formed of a solid piece of wrought iron, are 6 1/2 feet long, 30 inches of which are set in the ground, and are punched for four lines of wire 12 inches apart. The Barb Wire can be fastened on, either by short pieces of wire passed around and through the holes and twisted or tied in a knot, or by common staples clinched on the opposite side. These posts can be set without digging holes, although in extremely hard ground it is advisable to drive down a crowbar or piece of iron before putting down the post. They weigh about 10 pounds. List Prices, for regular size as above (extra when different length or number of holes):

IRON POSTS, Painted, 45 Cents. Galvanized, 60 Cents.

A. LESCHEN & SONS,

Manufacturers of

WIRE ROPE

Hemp Packing,
Twines,
F. S.

1919 to 928 N. Main St., ST. LOUIS, MO.

Correspondence invited.



O. LINDEMANN & CO.,
Manufacturers of
Japanned, Brass,
Tin Plated
and Wood

BIRD CAGES

Original inventors
and patentees of
Bright Metal Cages,
constructed without
solder.

254 Pearl St.,
NEW YORK.

CARY & MOEN,
Manufacturers of
STEEL WIRE for all purposes and STEEL SPRINGS of every description.

Market Steel Wire, Crinoline Wire, tempered and covered.
Also Patent Tempered Steel Furniture Springs, constantly on hand.
934, 236 and 238 West 29th Street, NEW YORK.

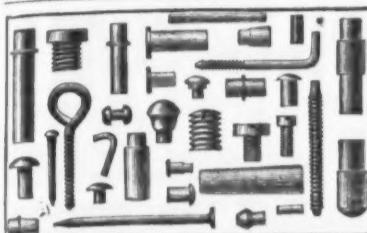


THE FRED. J. MEYERS MANUFACTURING CO.,
COVINGTON, Ky.,
Manufacturers of

WIRE GOODS OF ALL KINDS,

Wrought-iron Fencing, Cresting and Hardware Specialties.

Send for Illustrated Catalogue of 1883.



POPE, COLE & Co.

BALTIMORE COPPER WORKS,

No. 57 South Gay St., BALTIMORE, MD.

Have always on hand and for sale

INGOT COPPER,

Also Cakes, of unequalled purity and toughness.

CLEVELAND WIRE WORKS:

W. S. Tyler

MANUFACTURERS OF
Revolving Coal Screens,

Coal Yard Screens and
Tinners' Riddles.

Wire Cloth of Every Description Made and
Carried in Stock.

CLEVELAND, - - - OHIO.

Bergen Port Spelter.

MINES: Lehigh Valley, Pa. WORKS & FURNACES, Bergen Port, N. J.
The only Miners and Manufacturers of

PURE

LEHIGH SPELTER

From Lehigh Ore.

Especially adapted for
Cartridge Metal and German Silver.
Also manufacturers of

BERGEN PORT OXIDE ZINC.
Superior for LIQUID PAINT on account of its body
and wearing properties.

BERGEN PORT ZINC CO.
E. A. FISHER, Agent, 13 Burling Slip, N. Y.

EDES, MIXTER & HEALD
ZINC CO.,

MANUFACTURERS OF

PURE SPELTER

Made from the Company's Celebrated
Imperial Zinc Mines.

It is Soft and Ductile, and of very unusual
strength. Is especially adapted for Cartridge
Brass, German Silver and all Fine
Work.

SALES OFFICE

PLYMOUTH, MASS.

WORKS AND MINES:

KNOXVILLE, TENN.

ADDRESS ALL COMMUNICATIONS TO SALES
OFFICE.

G. M. HOTCHKISS & CO.,

West Haven, Conn.,

MANUFACTURERS OF

Brass, Iron & Steel Keys,

Locksmiths' and Bellhangers' Supplies,

HARDWARE SPECIALTIES.

Illustrated Catalogue Furnished on Application.

Also Brass and Nickel Plated
Suspender Buckles.

NOVELTIES OF ALL KINDS, MADE EITHER OF
SHEET METAL OR WIRE, A SPECIALTY.

FINE WOOD PHOTO-ENGRAVING
SEND COPY FOR CROSSCUP & WEST,
ESTIMATE IT WILL PAY YOU 1702 CHESTNUT PHILA. PA.

IRON AND BRASS RIVETS, STUDS, PINS, SCREWS, &c.,

For Manufacturers of Light Hardware.

BLAKE & JOHNSON, Waterbury, Conn.

SLEIGH SHOE STEEL, rolled
from solid Steel Billets, either
Flat, Oval, Tapered, Half
Round, Concave or Convex.
Also CUTTER SHOES, tem-
pered, bent and finished.

GAUTIER STEEL DEPART-
MENT of Cambria Iron Co.,
Johnstown, Pa.

NEW YORK OFFICE:
104 Reade St.

[No. 51.]

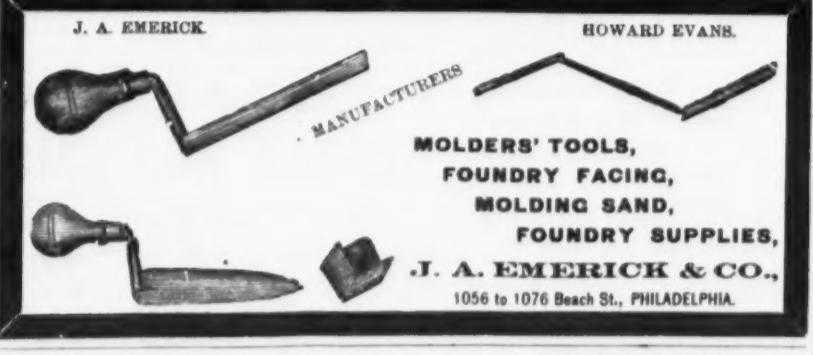
PHILADELPHIA OFFICE:
523 Arch St.

CHARLES A. OTIS, President. SAM'L ANDREWS, Vice President. SAM'L A. SAGUE, General Manager.
THOS. JOPLING, Treasurer. JOHN C. ANDREWS, Secretary.

THE AMERICAN WIRE COMPANY, DRAWERS OF IRON AND STEEL WIRE OF EVERY DESCRIPTION

GALVANIZED, TINNED AND COPPERED WIRE.
High Grade and Fine Quality Wires a Specialty.

CLEVELAND, OHIO.



ESTABLISHED 1837.

H. S. CHASE, Sec'y.

INCORPORATED 1876.

C. F. POPE, Treas.

Waterbury Mfg. Co., WATERBURY, CONN.

Brass Goods.

PRIZE MEDALLISTS.

Exhibitions of 1862, 1865, 1867, 1872, 1873, and only Award and Medal for Noiseless Steel Shutters at Philadelphia 1876, Paris 1878, and Melbourne 1881.

CLARK, BUNNELL & CO., Limited,
Late CLARK & COMPANY.

Original Inventors and Sole Patentees of

Noiseless, Self-Coiling, Revolving Steel Shutters.

Fire and Burglar Proof Also, Improved ROLLING WOOD SHUTTERS of various kinds, and Patent
METALLIC VENETIAN BLINDS.

Office and Manufactory, - - 162 & 164 West 27th Street New York.

MENDEN & SCHWERTE IRON AND STEEL WIRE WORKS,

AT SCHWERTE, WESTPHALIA, GERMANY.

The largest Wire Works in the world. Make, on 12 trains, STEEL AND IRON WIRE RODS of all
dimensions and descriptions.

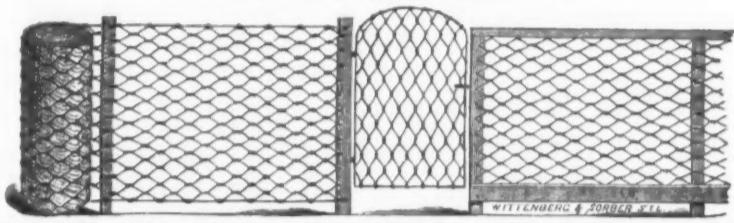
SCREW, RIVET, NAIL AND CHAIN RODS, SPECIALTIES.

SOLE GENTS FOR THE UNITED STATES

WOLTMAN & MICKERTS,

5 North Second Street,
ST. LOUIS, MO.

LUDLOW-SAYLOR WIRE CO., ST. LOUIS, MO.



WIRE, WIRE CLOTH, WIRE ROPE,
Counter Railings, Window Guards, Iron and Wire Fences,
PLAIN AND BARBED FENCING WIRE.

THE GILBERT & BENNETT MFG. CO.

Georgetown, Conn.,

Manufacturers of

Iron Wire, Sieves and
Wire Cloth,

Power Loom Painted Screen Wire Cloth,

GILBERT'S RIVAL ASH SIEVE,

Galvanized Twist Wire Netting,

WAREHOUSE:

49 City Street, New York.

WROUGHT IRON FENCES,

FOR RESIDENCES, PUBLIC BUILDINGS, PARKS, &c., &c.

Bank and Office Railing, Window Guards,

IRON AND BRASS BEDSTEADS,

For Prisons, Asylums, Hospitals, Jails, &c., absolutely vermin-proof.

WIRE AND IRON WORK OF EVERY DESCRIPTION.

Send for Catalogue, stating your wants, and we will make estimate.

Mention this paper.

THE E. T. BARNUM WIRE AND IRON WORKS,
DETROIT, MICH., U. S. A.

THOMPSON McCOSH, President

JOHN A. McCOSH, Sec. and Treas.



BURLINGTON, IOWA.

HAWKEYE STEEL BARB FENCE CO.

LIGHTEST & BEST

4 POINTED BARB IN EXISTENCE.

LICENSED AND PATENTED.

Chicago, Nos. 16 and 18 West Lake Street.

WIRE CLOTH, WIRE COUNTER RAILINGS,

WIRE SIGNS,

Roof Cresting,

&c.

NATIONAL WIRE AND IRON CO., Detroit, Mich.

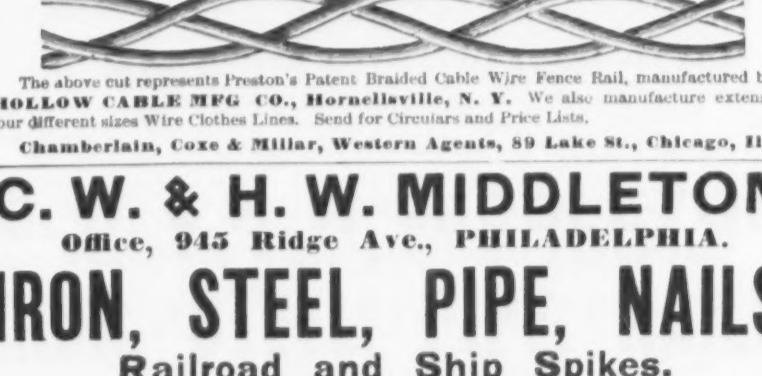
Casting Brushes,

Sand and Coal Screens,

WEATHER VANES AND STABLE FIXTURES.

Send for Catalogue.

Mention this Paper.



The above cut represents Preston's Patent Braided Cable Wire Fence Rail, manufactured by the HOLLOW CABLE MFG. CO., Hornellsville, N. Y. We also manufacture extensively four different sizes Wire Clothes Lines. Send for Circulars and Price Lists.

Chamberlain, Cox & Miller, Western Agents, 89 Lake St., Chicago, Ill.

C. W. & H. W. MIDDLETON,

Office, 945 Ridge Ave., PHILADELPHIA.

IRON, STEEL, PIPE, NAILS, Railroad and Ship Spikes.

AGENTS FOR

Allis Patent Steel "Buck Thorn" Barb Fence,

AMERICAN BRONZE WORKS.
Bronze and Brass Bearings and Ornamental Castings.
Car and Locomotive Work a Specialty.

BRONZE BEARINGS.

23 Columbus Street, CLEVELAND, OHIO.

OGDEN & WALLACE,
85, 87, 89 & 91 Elm St., New York.
Iron and Steel
Of every description kept in stock.
Agents for Park Brother & Co.'s
BLACK DIAMOND STEEL.
All sizes of Cast and Machinery Steel constantly on hand.

PIERSON & CO.,
Established 1790,
24 & 26 Broadway, 77 & 79 New St.
NEW YORK CITY.

Ulster-Iron.

All Sizes and Shapes kept in Stock.

ABEEL BROS.,
190 SOUTH ST., NEW YORK.
365 WATER ST.,
"ULSTER" IRON,
"CATASAUQUA" IRON,
ALLENTOWN SHAFTING,
COMMON IRON,
And full assortment of sizes of the best brands of
REFINED IRON,
Band, Hoop, Scroll and Angle Iron, Cast, Spring,
Tee-Calk and S. S. Steel
TELEPHONE CALL, "NASSAU, 379"

A. R. WHITNEY & CO.,
Manufacturers of AND DEALERS IN
IRON.
Warehouses : 56, 58 and 60 Hudson St.,
93, 95 and 97 Thomas St.
AGENCIES :
PORTAGE IRON CO., Limited, Merchant Iron,
SAMSONDALE IRON WORKS, Merchant Iron,
NORWAY IRON AND STEEL WORKS, Homogeneous Steel Plates.
BAY STATE IRON CO., Tank, Boiler and Girder
Plates.
BRANDYWINE ROLLING MILL, Boiler Plates,
GLASS TUBE WORKS, Boiler Flues.
A. M. BYERS CO., Wrought Iron Pipe.
CARNEGIE BROS. & CO. Limited, Wrought
Iron Beams, Channels and Shapes.
Bessemer Steel Shafting, Plain and Polished,
WIRE NAILS.

Plans and estimates furnished and contracts made for erecting Iron Structures of every description. Books containing cuts of all iron made sent on application by mail. Sample pieces at office. Please address 58 Hudson St., New York.

BORDEN & LOVELL,
Commission Merchants,
70 & 71 West St.,
L. N. LOVELL, G. A. GREENE, H. L. FREELAND, — NEW YORK.

Agents for the sale of
Fall River Iron Co.'s Nails,
Bands, Hoops & Rods,
AND
Borden Mining Company's
Cumberland Coals.

WILLIAM H. WALLACE & CO.,
IRON MERCHANTS
Cor. Albany & Washington Sts.
NEW YORK CITY.
WM. H. WALLACE, WM. BISPHAM.

GARRY IRON ROOFING COMPANY
Largest manufacturers of Iron Roofing in the world. Manufacturers of all kinds of
IRON ROOFING
Crimped and Corrugated Siding, Iron Tile or Shingle, Fire-Proof Doors, Shutters, &c.

PASSAIC ROLLING MILL CO.,
Manufacture and have always in stock
ROLLED IRON BEAMS,
Channels, Angles, Tees, Merchant Bars, Riveted Work,
Forgings, Eye Bars, &c.
PATERSON, N. J.
Room 45, Astor House, New York.

CUT NAILS.
Hot Pressed Nuts, Bolts, Washers, &c.

DOVER IRON CO'S

BOILER RIVETS,
Boiler Brace Jaws, Socket Bolts, &c.

FULLER BROTHERS & CO.
139 Greenwich Street, New York.

Marshall Lefferts & Co.,
90 Beckman St., New York City.
MANUFACTURERS OF
Galvanized Sheet Iron,
Best Bloom, Best Refined and Common.
Galvanized Wire Telegraph and Fence; Galvanized Hoop and Band Iron, Gravitated Rod and Bar Iron, Galvanized Nails, Galvanized Chain, Galvanized Iron Pipe.

CORRUGATED SHEET IRON

For Roofing, &c., Galvanized, Plain or Painted
Best Charcoal, Best Refined and Common

SHEET IRON.

Plate and Tank Iron,
C No. 1, C. H. No. 1, C. H. No. 1 Flange, Best Flange,
Best Flange Finc Box, Circles.

ALL DESCRIPTIONS OF

Iron Work Galvanized or Tinned to Order.

Price list and quotations sent upon application.

ROME MERCHANT IRON MILLS,
ROME, N. Y.,
Manufacturers of the best grade of
Bar Iron, Bands and Fine Hoops.

scrolls, Ovals, Half Ovals, Half Rounds, Hexagon and
Horse Shoe Iron. Also from Charcoal Pig a superior
quality of Iron, being made by the process of
reduced by hammer. Orders may be sent to the Mill or
to J. O. CARPENTER, our Agent, at 59 John
Street, New York.

FOX & DRUMMOND,
RAILWAY

AND

ROLLING MILL

MATERIAL.

68 WALL STREET,

NEW YORK.

JAMES WILLIAMSON & CO.,

SCOTCH AND AMERICAN

PIG IRON,

No. 63 Wall St., New York.

ULSTER IRON WORKS,

90 Broadway, New York.

Tuckerman, Mulligan & Co

CARMICHAEL & EMMENS

130, 132 & 134 Cedar St., New York, and
Nos. 21, 23, 25 & 7 West Lake St., Chicago, Ill.
DEALERS IN

IRON AND STEEL BOILER PLATE.

Lap-Welded Boiler Tubes, &c., &c.

Agent for The Coatesville Iron Co. The Laurel Rolling Mills, and Union Tube Works; Wrought Iron Beams, Angles, Tees, Rivets, &c.

PITTSBURGH TOOL CO.,

Successors to

ALKER & CROMLISH,

Twist Drills, Reamers, Taps and

MACHINISTS' SPECIAL TOOLS,

Machine, Car and Bridge Bolts, Set and Cap

Screws, Boiler Rivets, &c.

LIGHT MACHINE FORGINGS A SPECIALTY.

P. O. Box 1060, Pittsburgh, Pa.

FACTORY:

Corner North & Irwin Avenues, Allegheny, Pa.

VOUGHT & WILLIAMS,

DEALERS IN

Horse Shoes and Horse Nails, Tire

Spring, Toe Calk, Machinery and

Tool Steel, Bolts, Rasps, Files,

Drilling Machines, &c.

288 Greenwich St., New York.

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

GARRY'S PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9.

PATENT

IRON ORE PAINT AND CEMENT.

152-154 MERIWETHER ST., CLEVELAND, O.

Send for Circular and Price

List No. 9

**Siemens' Regenerative
GAS FURNACE.**
RICHMOND & POTTS,
119 • Fourth St., PHILADELPHIA, PA.

**HENRY LEVIS & CO.,
Manufacturers' Agents**
For Iron and Steel Rails, Car Wheels, Boiler and
Sheet Iron and General Railway
Equipments.
Old Rails, Axles, and Wheels bought and sold.
234 S. 4th St., Philadelphia.

Cambria Iron and Steel Works.

The Cambria Iron Co.,
having enjoyed a reputation for more than a
quarter of a century for fair dealing and excellence
of its manufactures, has now a capacity of
150,000 Tons of Iron & Steel Rails
And most approved patented
Railway Fastenings.

Address
CAMBRIA IRON COMPANY,
218 South Fourth Street, Philadelphia,
or at Works, Johnstown, Pa.,
or Lenox Smith, Selling Agent, 46 Pine St.,
New York.

having acquired the entire ownership of the

WIRE AND STEEL MILLS
Of the GAUTIER STEEL CO., Limited, will continue to produce all their specialties, such as Merchant Steel, Plow Steel, Wagon and Carriage Springs, Rake Teeth and Harrow Teeth, Agricultural Implement Steel and

ALL KINDS OF WIRE,

Well-known for superior quality of material and
excellence of workmanship.

Address
GAUTIER STEEL DEPARTMENT,
PHILIP E. CHAPIN, Gen'l Sup'ly, Johnstown,
New York Warehouse, 104 Reade St.
Philadelphia Warehouse, 523 Arch St.

THE PHOENIX IRON CO.,
410 Walnut Street, PHILADELPHIA.
Manufacturers of Wrought Iron

Beams, Deck Beams, Channels, Angle & Tee Bars,
STRAIGHT AND CURVED TO TEMPLATE,
Largely used in the construction of Iron Vessels, Buildings and Bridges.
WROUGHT IRON ROOF TRUSSES, CIRDERS & JOISTS,
and all kinds of Iron Framing used in the construction of Fire Proof Buildings,
PATENT WROUGHT IRON COLUMNS, WELDLESS EYE BARS,
and built up shapes to Iron Bridges.
REFINED BAR, SHAFTING, and every variety of SHAPE IRON made to order.
Plans and Specifications furnished. Address
DAVID REEVES, President.
NEW YORK AGENTS, MILLIKEN & SMITH, 98 Liberty Street.
BOSTON AGENTS, FRED. A. HODDLETT & CO., 19 Batterymarch St.

ALAN WOOD & CO.,
MANUFACTURERS OF

Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom

PLATE & SHEET IRON.
No. 519 Arch St., Philadelphia, Pa.

Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack, Tank and Boat Iron; Cast, Stamping, Ferrule, Locomotive Headlight and Jacket Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator Steel; Skew Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop Iron.

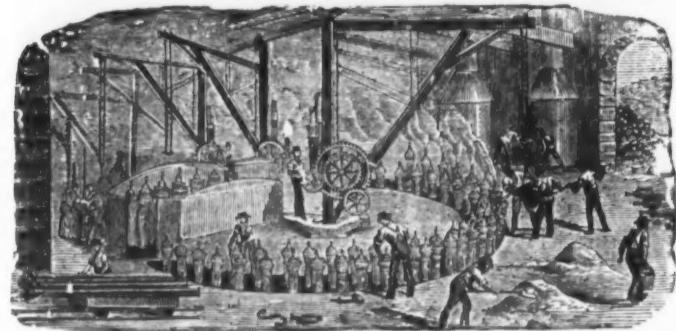
Also, the James Rowland & Co. Kensington Nails, cut from

their Refined Anvil stock. Also, Plow and Cultivator

November 8, 1888.

A. H. McNEAL,
BURLINGTON, N. J.

FLANGE PIPES.



CAST IRON PIPES,
FOR WATER AND GAS.

ESTABLISHED IN 1848.

SINGER, NIMICK & CO., Limited,
PITTSBURGH, PA.,

MANUFACTURERS OF ALL KINDS OF

HAMMERED AND ROLLED
STEEL,

Warranted Equal to any Produced.

BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear Knives, Cold-Chisel and Machinists' Tools generally.

SAW PLATES

For Circular, Muley, Mill, Gang, Drag, Pit and Cross-Cut Saws.

Sheet Steel

For Springs, Billet Web and Hand Saws, Shovels, Cotton Gin Saws, Stamping Cold, &c., &c.

SIEMENS-MARTIN (Open-Hearth) PLATE STEEL

For Hoppers, Fire-Boxes, Smoke-Stacks, Tanks, &c.

All our Plate and Sheet Steel being rolled by a Patented Improvement, is unequalled for surface finish and exactness of gauge.

ROUND MACHINERY CAST STEEL

For Shafting, Spindles, Rollers, &c., &c.

File, Fork, Hoe, Rake, R. R. Frog, Toe-Calk, Sleigh-Shoe and Tire Steel, &c.; Cast and German Spring and Plow Steel.

Iron Center "Cast Plow Steel," Soft Steel Center "Cast Plow Steel," Solid Soft Center "Cast Plow Steel."

Finished Rolling Plow Coulters, with Patent Screw Hub. Agricultural Steel cut to any pattern desired. Attached. Steel Forgings made to order.

Represented at 243 Pearl & 18 Cliff Sts., New York, & 417 Commerce St., Philadelphia, by HOGAN & SON, General Agents for Eastern and New England States.

THE MIDVALE STEEL COMPANY,
CRUCIBLE AND OPEN-HEARTH STEEL.

TIRES and AXLES
OF EVERY DESCRIPTION.

T. GUILFORD SMITH & CO., Proprietors, Boston.

SILVER & DEMING MFG. CO.,

MANUFACTURERS OF
Cistern, Pitcher, Well
and Force Pumps,
Wind Mill Pumps,
HAND AND POWER
ROTARY PUMPS,
Hydraulic Rams,
BOILER FEED PUMPS,
Garden Engines, &c.
Also, Carriage Makers' Tools,
Blacksmith Drills, Butchers'
Tools, and Feed Cutters.

Write for Catalogue and Prices.

SILVER & DEMING MFG. CO.,
SALEM, OHIO. U. S. A.



JOHN MAXWELL,
Manufacturer of
Patented
BRASS, BRIGHT
TINNED WIRE
& JAPANNED

Bird Cages.
The cheapest and most
satisfactory in market.

Catalogues and Price
Lists furnished to the
Trade.
847 & 949 Pearl St.,
New York.



Full size of Band for Brass and Tinned Wire Cages.



DUNBAR BROS.,
Manufacturers of

Clock Springs and Small Springs
of every description, from best Cast Steel.

BRISTOL, CONN.

Schenectady Molding Sand Co.

ALBANY AND SCHENECTADY
MOLDING SAND
delivered on cars or boats at low rates. All grades
guaranteed. All orders will receive prompt atten-
tion. Address, J. G. GREENE, Sec.,
22 Wall St., SCHENECTADY, N. Y.

G. S. VEEDER, Pres.; J. G. GREENE, Sec. and Treas.

MICHIGAN BLOCK WORKS,
Detroit, Mich., U. S. A.



Send for Catalogue and Price List.

BUFFALO SCALE CO.,
BUFFALO, N. Y.

Manufacturers of
R. H. Track Scales, Hay Scales, Coal
Scales, Grain Scales, Platform
Scales, Counter Scales, &c.

Send for price list, stating what you want.

CLOTHES WRINGERS.



T. J. ALEXANDER, Manager,
BOSTON, MASS.

NEW MAKE OF MINE LAMP.

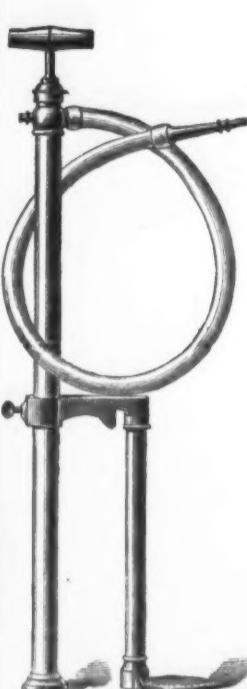


LEONARD BROS., Scranton, Pa.

HAMMER HANDLES.

Hammer and Hatchet Handles for
Tool Makers.

S. MUSSelman & SON,
QUAKERTOWN, PA. U. S. A.



latter for our perusal, in which the statement is made "that there is on the average 19 pounds of metal upon every box of C 14 x 20, and 38 pounds upon every box of C 28 x 20, and there is no term going into the market that has such a heavy coating." We cannot, of course, pretend to decide between these conflicting claims, but the statements are interesting all the same, and should command the attention of every consumer. It would seem that no one need hesitate to buy either of these brands so far as thickness of coating is concerned.

NEW PUBLICATIONS.

INDUSTRIAL EDUCATION IN THE UNITED STATES
A Special Report by the U. S. Bureau of Education.
Size, 6 x 9 inches; 320 pages, illustrated.
Pamphlet form.

The report itself covers 77 pages of the work, the remainder being devoted to appendices of particulars in regard to the various schools, the condition of education in the various States, and a mass of other valuable information is given. Although we have not yet had time to go through this work with the thoroughness which it deserves, we have seen enough of it to be able to say that it appears to be one of the most satisfactory reports which have been made to the Government for some time. It certainly is deserving of careful attention from manufacturers, who, of all men, are the most interested in industrial education. Such an education is needed in order to furnish material for the filling of our factories, and, in another sense, in order to furnish a market for our own industrial products. It is a curious fact that in certain parts of the country mechanical devices are used and freely sold which cannot, on account of the ignorance of the people, be disposed of in other countries, or even in other parts of our own country. The sewing machine has done wonders toward educating the public in the use of machinery. In the same manner the steam engine has done a vast amount of mechanical education. One of the chapters which is very interesting in this work is that devoted to the courses in the Massachusetts Institute of Technology. This, like the report from Stevens Institute and the Washington University, is illustrated.

DETAILS OF MACHINERY. By Francis Campin, C. E., Weale's Series; 4 x 7 inches in size; 250 pages, numerous illustrations. Price, \$1.20.

This work is in some respects deceptive in the nature of its title, for while it is devoted to the details of machinery in the fitting shop, foundry and boiler yard, it is not, as one might suppose, a book devoted to designing and to the general work of construction. It treats at length, in a strictly arithmetical way, of the method of calculating the strains, sizes of parts necessary in the various details of machinery, and also gives arithmetical rules for solving most of the questions which are met in ordinary machine designing. There is, in addition to the mathematical part, a very considerable amount of matter relating to forms, sizes, methods of construction and other incidental matters. It seems a pity that some of our more experienced and scientific engineers do not produce a book, based on American practice, similar to this in character. The sale which it would have would be very large. Even this work, although largely intended for European use and founded entirely on English and Continental practice, will be found very useful by the mechanical man, and will undoubtedly be largely sold and used.

RECENT PRACTICE IN MARINE ENGINEERING. In parts. By William H. Maw. Published by John Wiley & Sons. Size, 11 x 15 inches, pamphlet form. Price, \$1 per part.

We have before us parts 4, 5, 6 and 7. The engines illustrated are mostly reprinted from *Engineering*. They are given in great detail, and embrace all classes, from the heaviest engines for gunboats and ocean steamers, to the little affairs used in steam launches and torpedo boats. Everything is embraced in the scope of the work, from chain-towage engines to hoisting machines for steamers. As a record of what has been and is being done abroad in the way of marine-engine building, this work is invaluable. The material goes back in some cases as far as 1874-5, and we see that Mr. Emery's experiments while connected with the Navy Department, on the Gallatin, and also, we believe, on the Rush and Dexter, are given. Many of the engines present novelties of construction which are very valuable; others are of interest on account of being the latest practice of the best engineering firms. One of the latest numbers that have come to hand shows the engines of the Arizona. In many cases the reading matter accompanying the engravings is of the greatest interest. Few engineering establishments, whether marine or otherwise, can afford to be without a work of this class, since the studies and details are so suggestive that few engineers can go through them with any care without deriving a great deal of benefit from such examination.

KINEMATICS: A Treatise on the Modifications of Motions as Affected by the Forms and Modes of Connections of the Movements of Machines. By Charles William MacCord, A. M. Size, 6 x 9 inches; 325 pages, 300 illustrations, bound in cloth. Published by John Wiley & Sons. Price, \$5.

The somewhat misleading title of this work does not in any sense impair its value or its novelty. It treats of many things not met with in other works on mechanics, bringing up many problems and showing successful methods of solution which are not, so far as we remember, treated either as simply or as thoroughly as here. The engravings are probably the best which have appeared in any work of the kind in this country, and remind one very much of the engravings in the original editions of Weisbach. We can hardly hope to give the reader a clear idea of the subjects which are taken up. Among those which will probably be found of the greatest interest are some chapters on gearing of various kinds, with subdivisions covering the manufacture of gear-cutters, diametrical pitch, path of contact, limiting numbers of teeth, maximum pitch for given obliquity, computation tables, &c. The chapter on low-numbered pinions is one of decided interest, and one could almost wish that this chapter had been

extended and other forms of gearing considered. Pin and elliptical gearing, racks, spur and bevel wheels, and the discussion of various theories are among some of the other chapters which we have glanced at and found full of interest. The chapters on the hour-glass worm and the Albro and Hindley worm are very interesting, and we wish they had been extended. The matter of the appendix covering the subject of laying out curves of various kinds and other kindred matter is very valuable.

Clem & Morse's Safety Elevator Attachment.

The three illustrations which accompany this article represent a new form of safety attachment for an elevator which we believe



Clem & Morse's Safety Elevator Attachment.

Fig. 1.—Side View and Section.

actually does what its name indicates—provides a safety appliance which will guard against all accidents arising from the too sudden dropping of the coach, either by the running away of the machinery, breaking of the rope, or other similar accidents. It is made by Messrs. Clem & Morse, 413 Cherry street, Philadelphia, Pa. Fig. 1 is a side view

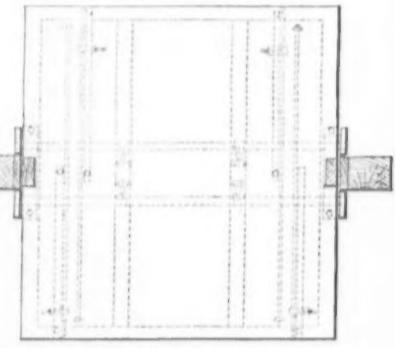


Fig. 2.—Plan.

and section, Fig. 2 a plan, and Fig. 3 a side view taken at right angles to Fig. 1. The principle on which the elevator operates is, we think, somewhat novel. The mechanism by which the platform is stopped in case the rope breaks or an excessive speed is reached consists of a pair of toothed cams, shown in Fig. 1, which are partly rotated so as to

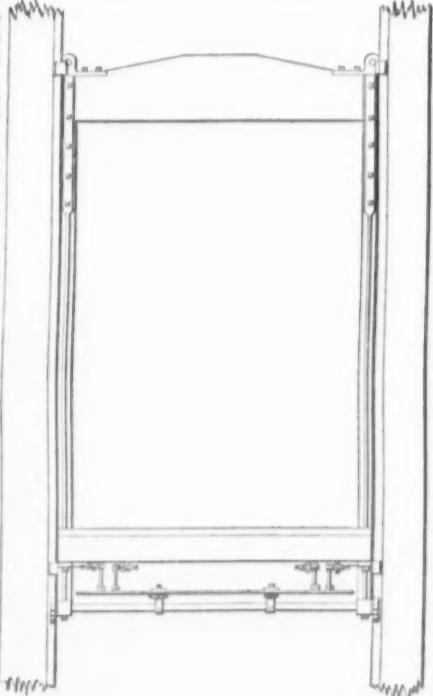


Fig. 3.—Side View Between Guides.

engage in the wooden sides of the guides and hold the platform at any point. These are operated by bell cranks, attached, as shown in Fig. 3, to what may be called a table. This table is nearly the whole size of the elevator platform, and is made of 1/2-inch pine. It is supported on straight steel springs, shown crossing each other in Fig. 1, and attached to the outer edges. These springs are so adjusted that the table is practically without weight, and may be said to float in the air beneath the platform. If this table be raised even a short distance, the

OLD DOMINION

CUT NAILS, BAR IRON.

Address R. E. BLANKENSHIP

RICHMOND, VA.

GEORGE BROOKE, President.

GEO. W. HARGISON, Treasurer.

THE E. & G. BROOKE IRON CO.,

Birdsboro, Berks Co., Pa.,

Manufacturers of

ANCHOR BRAND NAILS AND SPIKES.

Capacity 1000 Kegs per Day.

Made from their own Pig Iron, insuring regularity and superiority in quality.

Also, FOUNDRY AND FORGE

PIG IRON,

And Cold Blast Charcoal Car Wheel Iron.

NATIONAL HARDWARE & MALLEABLE IRON WORKS,

Lehigh Avenue, American and Third Streets, Philadelphia.

THOMAS DEVLIN & CO.,

MALLEABLE, FINE GRAY IRON AND STEEL CASTINGS made from patterns to order. Special attention given to Tinning, Bronzing, Coppering, Japanning and Fitting. A large line of Carriage and Wagon Castings constantly on hand for the trade.

MALLEABLE IRON CASTINGS

TO ORDER.

Air Furnace Process. Quality Guaranteed. Send for Estimate.

SPECIALTIES IN SADDLERY and WAGON HARDWARE,

YOUNGSTOWN MALLEABLE IRON COMPANY, YOUNGSTOWN, Ohio.

BRIDGEWATER IRON CO., Bridgewater, Mass.

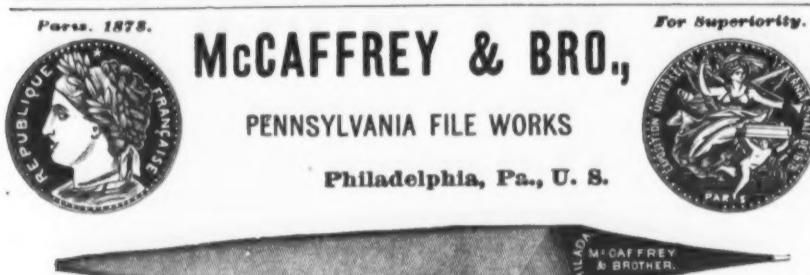
Manufacturers of

SEAMLESS DRAWN BRASS & COPPER TUBES,

CUT NAILS, HORSE NAILS, FORGINGS, &c.

NAHUM STETSON, Jr., Agent, 73 Pearl Street, New York.

AUBURN FILE WORKS,
Superior Hand-Cut
FILES AND RASPS,
MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.
FULLER BROS., Sole Agents,
97 Chambers and 81 Reade Streets, N. Y.



Manufacture and keep in stock a full line of **FILES** and **RASPS** only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.

DETROIT FILE WORKS,
DETROIT, MICH.

MANUFACTURERS OF
Send for Catalogue. **FILES & RASPS** The Largest Hand File Works in the U. S.

Proprietors: ROWE & HAYES, Detroit, Mich.

HISCOX
FILE MFG. CO., FILES.
EQUAL TO THE
BEST.

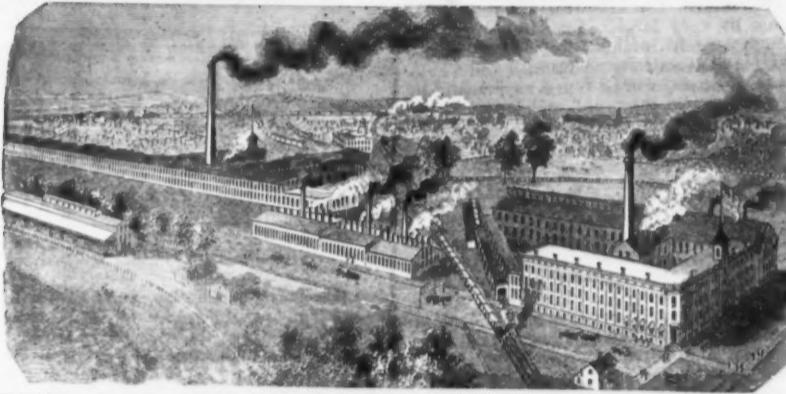
Send for Prices.

GRAHAM & HAINES, 113 Chambers St., New York.
SOLE AGENTS FOR



All Metal Adjustable Corn Husker. Made entirely of Brass, without leather straps, loose rings, web or set screws to wear out and render it useless. Only one size which is of importance to the trade, as there are no odd sizes that are unsalable. Send a sample order. Packed one-fourth gross in a box.

CARRIAGE HARDWARE.



THE E. D. CLAPP MFG. CO., Auburn, N. Y.
HENLEY'S CHALLENGE ROLLER SKATE.



The Latest and Best and Most Complete Scientific
SKATE
IN THE MARKET.
PATENTED
October 16, 1880
AND
August 23, 1881.

LIBERAL TERMS TO THE TRADE.
For Prices, Circulars and further particulars, address, mentioning *The Iron Age*,
M. C. HENLEY, Pattee and Manufacturer.
309 North Fourteenth Street, RICHMOND, IND.

TACKS, NAILS & RIVETS.

Swedes Iron Upholsterers Gimp, Lace and Card Tacks. Black and Tinned Trunk and Clout Nails. Finishing Nails and Brads; Shoe Nails of Swedes and Common Iron; Copper, Brass & Steel Linings & Saddle Nails; Tufting Nails & Tufting Buttons; Brass and Iron Wire Nails, Molding Nails, Escutcheon Pins, Black and Galvanized Regular and Chisel Pointed Boat Nails.

New York Salesroom, 116 Chambers Street.
AMERICAN TACK CO., Fairhaven, Mass.

**Nicholson
FILES.**

Bandsaw Files,
Boot Heel,
Brass,
Cabinet,
Cant,
Cotter Taper,
Cotter Equaling,
Cross or Crossing,
Doctor,

Drill,
Feather Edge,
Finishing,
Flat,

Flat Equaling,
Flat Wood,
Gang-Edger,
Ginsaw,
Gulletting,
Half-Round,
Half Round Wood,

Hand,
Hand Equaling,
Handsaw Blunt,
Handsaw (Double-Ender),
Handsaw Taper, single-cut,
Handsaw Taper, double-cut,
Handsaw Taper, slim,

High Back,
Hook-Tooth,
Knife,
Knife Blunt,
Lead Float,
Lightning,
Machine Mill,
Mill,

Mill Blunt,
Mill Pointing,
Pillar,
Pitsaw,

Reaper,
Roller,
Round,

Round Blunt,
Slotting,
Slim Handsaw Taper,

Square,
Square Blunt,
Square Equaling Files,
Stave Saw,

Three-Square Files,
Three-Square Blunt Files,
Tumbler Files,
Union Cut,

Warding Files,
Warding Blunt File,
Warding Round Edge File.

RASPS.

Baker's,
Beveled Edge,
Bread,
Cabinet,
File, Flat and Half-Round,
Flat Shoe,

Flat Wood,
Half-Round Shoe,
Half-Round Wood,
Horse, Plain and Tanged,
Horse Mouth,

Jig,
Oval or French Shoe,
Racer, Plain and Tanged.

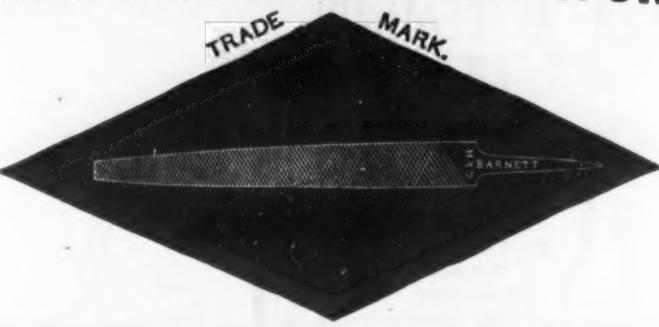
SPECIALTIES.

Butchers' Steels, Improved,
Bent Riflers, Handled,
File Cards,

File Brushes,
Machinists' Scrapers,
Stub Files & Holder,
Surface File Holder,
Vise File Holder.

**NICHOLSON
FILE CO.,
PROVIDENCE,
R. I.,**
SOLE MANUFACTURERS.

BLACK DIAMOND FILE WORKS



G. & H. Barnett, 21 to 43 Richmond St., Philadelphia.

CHARLES B. PAUL,
Manufacturer of **HAND CUT FILES.**

Warranted **CAST STEEL.**
All descriptions of Files made to order. Price List mailed on application.

Established 1863.

UNION FILE WORKS
311 to 315 North St.,
BALTIMORE, MD.,
Manufacturers of

FILES AND RASPS

Made from the Best Refined Cast Steel.
With all the requisite facilities to produce a first-class article, we are enabled to offer Files that will give entire satisfaction.

MORITZ & KEIDEL, Agents,
45 & 50 German St., Baltimore, Md.

THRIFT FILE WORKS,
Manufacturers of all kinds of
Files, Rasps.



CHRISTIAN HENSSLER,
426, 430, 432 & 434 Franklin St.,
PHILADELPHIA, PA.

FILES
JOHNSON & BRO.
No. 1 Commercial Street, Newark, N. J.

The Patent Combined
Dinner Pall and
Lantern.

The most perfect Dinner Pall
in the world. Hot coffee for
dinner and a Lantern at night.
Manufactured by JOS. HAIGHT,
PORT CHESTER, N. Y.
Sent by express on receipt of
\$1.00. Agents wanted.

STOVE REPAIRS.

Repairs for Stoves made at Troy, Albany, Rochester, Cleveland, Buffalo, Boston, St. Louis, Quincy, Chicago, Milwaukee and elsewhere, at
W. C. METZNER,

127 W. Randolph St., Chicago, Ill.

DURRIE & McCARTY, Agts., 97 Chambers St., New York.

HELLER & BROS., Newark, N. J.,
Manufacturers of the
Celebrated American
HORSE RASPS AND FILES,



Made of the best American Steel, and warranted to be unequalled in the market. For sale by Iron and Hardware dealers throughout the United States and Canada.



J. M. KING & CO.

WATERFORD, N. Y.

Manufacturers of the **BUTTONS PATENT**

"WIRE CUTTER AND PLIER COMBINED."

Specially Adapted for Use on Wire Fence.

Also Manufacturers of
Blacksmith and Machinists' Stocks and Dies, Plug and Taper Taps
Hand, Nut and Screw Taps, Pipe Taps and Reamers.

Established by DANIEL B. KING, 1849.

LIGGETT SPRING AND AXLE CO.
LIMITED, MANUFACTURERS OF
SPRINGS AND AXLES

For Coaches, Phaetons, Buggies, Wagons, &c.

Pittsburgh, Pa.

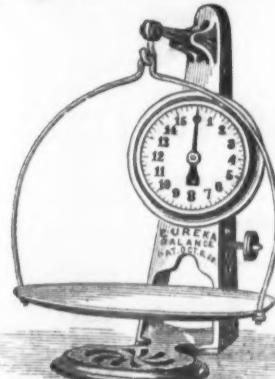


"COMMON SENSE" MOUSE TRAP.
BEST IN MARKET.
For Home & Export Trade.

RIPLEY MFG. CO.,
Unionville, Ct., U. S. A.,

Manufacturers of
Porcelain-Lined Lemon Squeezers, Mallets, Rosewood Faucets, Patent Boot Jacks and Hardware. Fine Wood Turning a Specialty.

Eureka Self-Adjusting SCALES.



Have a patented attachment for ascertaining the *tare* of a dish or other receptacle used in weighing without the use of weights or loss of time.

Manufactured only by
John Chatillon & Sons,
91 and 93 CLIFF ST., N. Y.
Send for Illustrated Price List.

WILDE'S PATENT Expanding Mandrel

IS THE MOST PERFECT NOVELTY OUT.
Simple, Inexpensive, Accurate.



COOKE & CO.,
22 Cortlandt Street, NEW YORK.
Sales Agents and Dealers in
GENERAL MACHINERY AND SUPPLIES

FOR
Manufacturers, Mills, Mines, Railroads
and Steamships.

Engines, Boilers, Pumps, Blowers, &c.

Write for circular and mention this paper.



SELF-FASTENING BY STEPPING
ON THE SKATE.

Brief mention is made of the following points in favor of the Austria Club Skate, to make it the most popular Club Skate now in vogue. It is stepped at the toe (there being but one screw in the skated, welded, hardened runner, solid steel clamp, &c. Can be adjusted more securely and quickly than any other Skate, are far superior to all other points for range of adjustment, to either the smallest and narrowest toe, or the extreme opposite. Send for sample and price to W. M. CORNWALL, 18 Warren St., New York. I carry in stock a complete line of all the prominent manufacturers of Skates. Top Skates, Straps for repairs, &c. Orders executed at manufacturers prices. Send for Trade Price List.

Grant Fan Mill & Cradle Co.

Manufacturers of
Grant's Grain, Coffee, Rice, Cochineal
and Pimento Fans,
and



GEORGE W. BRUCE,
1 Platt St., New York, Proprietor of the
ATLANTIC SCREW WORKS,
Agent for the
Florence Tack Co. and
C. A. Maynard.

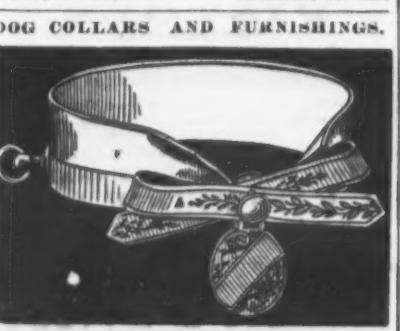
MAYNARD'S C. S. Planters' Hopper, Bag and Handled Planters, Cotton and Field Hoses. BRADE'S CROWNS, Planters' Crowns, Hoppers, Bag and Handled Planters, ELWELL'S Weeding, Planters' and Grub, and a variety of other kinds for Home and Export Trade.

ESTERBROOK'S STEEL PENS

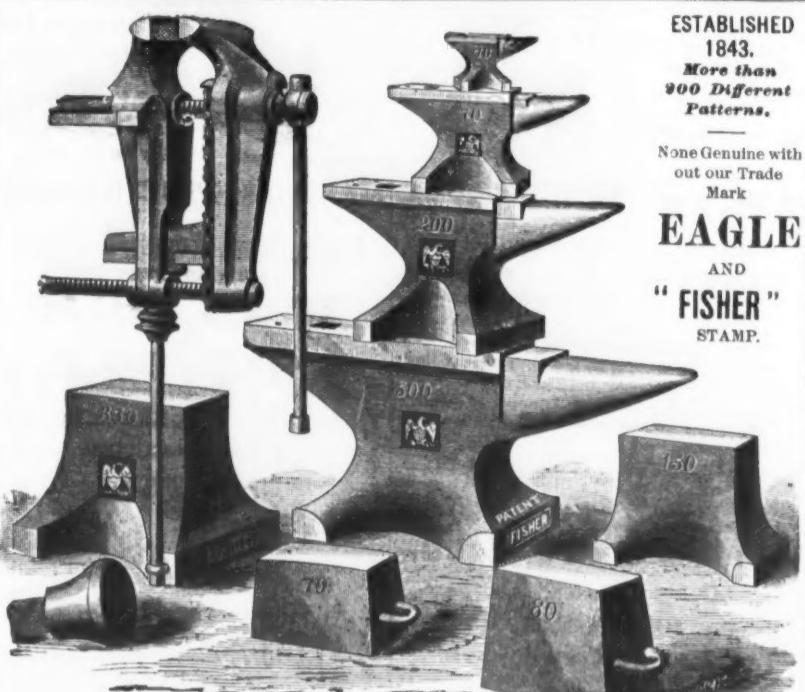
Leading Numbers: 14, 048, 130, 333, 161.
For Sale by all Stationers

THE ESTERBROOK STEEL PEN CO.,
Works, Camden, N. J. 26 John St., New York.

DOG COLLARS AND FURNISHINGS.



Send for Illustrated Catalogue.
MEDFORD FANCY GOODS CO.,
101 Chambers St. cor. Church New York.



ESTABLISHED
1843.
More than
900 Different
Patterns.

None Genuine with
out our Trade
Mark

EAGLE
AND
"FISHER"
STAMP.

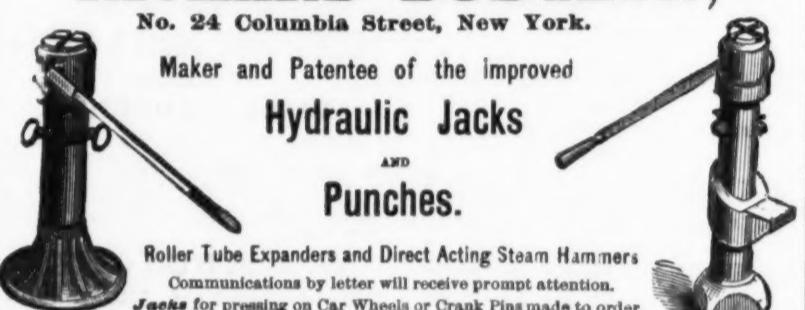
cogged cams are, by means of the bell cranks, turned so that their teeth catch the guideposts, and the downward motion of the platform itself forces them in until the motion is entirely arrested. In case the rope breaks or the platform starts downward at a speed above that for which the apparatus is set, the pressure of the air on the floating table forces it upward and the teeth engage, and the main platform is stopped within a space so small that it is scarcely worth measuring. We have seen the rope cast off repeatedly, which was equivalent to a break, and in each case the fall of the platform was altogether too small to be measurable. We have heard of experiments with the apparatus where care was taken to measure the actual distance of the fall, and it was said that the car was arrested within $\frac{1}{4}$ inch of the point where the rope was cut. Whether the car be run loaded or empty, the effect is the same, the teeth taking hold exactly in proportion to the weight on the platform. By adjusting the straight springs which hold the floating table in position, provision may be made for running the elevator at any desired speed or for tripping the gripping mechanism when any given speed has been exceeded. In Messrs. Clem & Morse's own establishment the vertical guides are lined on each side with heavy strips of ash. In the experiments which we have noticed the teeth usually scored the ash for an inconsiderable depth. Of course, with a heavy weight they would be pressed in perhaps $\frac{1}{8}$ inch or more.

The cams on both sides of the car, as will be seen in the plan view, are on one shaft, and near the center are the rock-shaft attachments for turning them. It would seem, from all that we have been able to learn of this apparatus, that it actually provides a device by which safety may be assured, and if attached to a car would prevent injury, not only by actual breakage of a rope, but would prevent those accidents which sometimes take place where the winding machinery gives way, allowing the car to fall, and yet the rope on the drum keeps up a sufficient tension to prevent the gripping devices from acting. It would obviate those cases where the governor rope breaks or fails to act. Messrs. Clem & Morse apply it not only to ordinary freight, but also to passenger elevators of all descriptions. It does not require any considerable alteration of either elevator or guides, the only requirement being that there should be sufficient clearance to enable the toothed cams to get a bearing on the edges of the wooden guides.

RICHARD DUDGEON,

No. 24 Columbia Street, New York.

Maker and Pattee of the improved
Hydraulic Jacks
AND
Punches.



Roller Tube Expanders and Direct Acting Steam Hammers

Communications by letter will receive prompt attention.

Jacks for pressing on Car Wheels or Crank Pins made to order.

ANSONIA BRASS AND COPPER CO.,

MANUFACTURERS OF

PURE ELECTRIC WIRE,

For Magnets, Telegraphs, Telephones, &c.

Insulated on the bare wire with H. Splitdorf's patented Liquid Insulation, covered with cotton or silk

All sizes of Bare and Covered Wire in Stock.

The conductivity of every bundle tested and warranted.

THE ANSONIA WROUGHT GONGS.

For Clocks, Indicators, Telephones, Call Bells, Bell Punches, Steamboat and Railroad Use. Burnished or Nickel Plated.

ANSONIA BRASS AND COPPER CO., 19 Cliff St., New York.

THE ESSEX HORSE NAIL CO., Limited.

THE ESSEX HORSE NAILS

Are drawn from the Best Norway Iron Rods only. They are hot forged and cold-pointed, rendering them both tough and stiff, and are warranted

FIRST-CLASS IN EVERY RESPECT.

By the use of improved machines we forge Fifty per cent. More Nails on a machine than any other company, and are thus enabled to sell them proportionately less than any other nail of equal quality. All nails branded ESSEX fully guaranteed.

GENERAL AGENTS:

HOWE & CO., TROY, N. Y.

Stanley Rule & Level Co.,

MANUFACTURERS OF

Improved Carpenters' Tools.



FACTORIES,
New Britain, Conn.

—
WAREROOMS,

29 Chambers St.,
New York.

Manufacturers of Bailey's Patent Adjustable Planes.
General Agents for the sale of Leonard Bailey & Co.'s "Victor Planes."
Manufacturers of "Debach" Patent Adjustable Planes.

GROOME, ROBERTS & CO.,

(FORMERLY OF J. F. BAILEY & CO.,)

IRON AND STEEL COMMISSION,

216 South Fourth Street, PHILADELPHIA.

Beams, Channels, Angles, Sheared and Universal Plates, Car Axles, &c.

BRIDGE SPECIFICATIONS A SPECIALTY.

MANUFACTURERS OF

GENUINE BRONZE, BRASS, AMERICAN BRONZED AND JAPANNED

HARDWARE,

Rim and Mortise Locks, Knobs and Escutcheons,

Apple Parers, Registers, Bronze and Cast Butts,

STATIONERS' HARDWARE, &c.,

READING HARDWARE CO., Reading, Pa.

which the quantity of water was regulated and limited to 25 the number of openings permissible in each tower. He nominated Messala Corvus to exercise the functions of administrator of the water, and empowered him to make laws regulating the supply. He granted him two assistants, and to them were accorded the same marks of dignity as were given to magistrates. When they exercised their functions outside the walls of the city, they were surrounded by a numerous escort composed of two lictors, three public slaves, an architect for each of them, clerks, messengers, tipstaves and criers equal in number to those accorded to the functionaries who distributed the wheat to the people. When they exercised their functions inside the city the lictors were withdrawn.

We thus see that the dignitary in charge of the maintenance of the water supply of Rome was empowered to exercise force in performing his duties. It was decreed that during the fourth part of the year they were to attend to the public and private demands relating to the distribution of water, but this order fell into disuse, either from the negligence or from the inability of some of the administrators, although the public treasurer continued to pay the tipstaves and other employees, who ought during that time to assist the administrators. The administrators were especially advised to prevent any distribution to individuals without an order from the prince, so that no one might obtain any public water that had not been granted him, nor any one receive more than was conceded to him.¹ This law had been so much neglected that Frontinus tells us "that by enforcing it he would be able, with the quantity of water recovered, to establish new fountains, and to supply new permits of the prince, and that it was necessary at all times to prevent fraud, by an active superintendence; in order to do so successfully, the aqueducts outside of the city should be visited from time to time, and also the water towers and public fountains, to enable the administrator to become acquainted with the nature of the concessions and to insure the flowing of the water night and day without interruption."²

Frontinus, in his "De Aque Ductibus Urbis Romae Commentarius," says: "Everything confided to us by the Emperor requires our greatest care, but I feel myself naturally disposed as much by duty as by taste to acquire myself well of the new functions with which the Emperor Nerva, a prince as zealous as well-intentioned for the interests of the Republic, has just charged me in confiding to me the administration of the water of Rome, both for their use and for their purity and safety, a function which has always been exercised by the first citizens of the State. I thought that the best way was to do in this as I have done in other circumstances, in order to well understand the object of my enterprise, and I do not believe, in fact, that there is a surer way to be able to judge well of what should be done and what should not be done, nor is there anything more shameful for an administrator than to act only by the counsels of his agents, which must certainly occur when the chief, from want of experience, is obliged to have recourse to those who should be under his direction, and who, although necessary, ought only to be regarded as the hands and instruments of the administrator. This is why I have followed in this the same method that I have pursued in several of my other functions, in arranging in order all the information I could obtain concerning this object, united in one body in this commentary to serve me as a guide during my administration."

Those who wished to have a concession of the public water had to obtain permission from the prince by a letter, which, if approved, was presented to the administrator of the water supply. The latter placed the affair in the hands of his assistant, who designated to the guardians of the water tower from which the water was to be drawn the location of the opening to be made, and the size of the gauge to be attached in accordance with the quantity of water conceded. A concession lasted as long as the person or persons lived in the locality for which the water was granted. This right could not be transferred to a purchaser of the locality nor could it be inherited with the property. But the public baths had the perpetual use of the water which had once been accorded to them. These long concessions were rendered necessary by the expense required to conduct the water to the locality to be supplied, often a long distance from the aqueduct, and requiring the construction of a private water tower or reservoir. When a concession became vacant, through the death or removal of the proprietor, it was publicly announced. The administrators had been accustomed to stop the distribution of water immediately on the expiration of a concession, and to sell the right to the new proprietors or to others, but the Emperor Augustus ordered 30 days to be granted, so as not to stop too suddenly so necessary a supply and to give time to make the customary demands for the renewal of the concession. Concessions were afterward made of the surplus water which ran from the reservoirs and from the leakage of the aqueducts. This last was very seldom permitted by the prince, for it was easy to enlarge the fissure so as to supply any quantity of water desired, and this flow aided the rapid destruction of the aqueduct itself.

Frontinus having measured the quantity of water entering the aqueducts, and having ascertained that it greatly exceeded that which was registered as having been employed for public use or granted by concessions, set to work to find by what negligence or fraud this great quantity was lost to the State, and to understand how to prevent it. He tells us that he found gauges of a diameter larger than was permitted by the concessions, some of which were not marked, which proved the dishonesty of the agent who controlled the placing of the gauges, he having been bribed to furnish more water than was justly due. In certain water towers the gauges were of the right size at the opening, but instead of maintaining this diameter for the distance required by law, a larger tube had been attached to the open-

¹ Frontinus, ch. ciii.

² Id. ciii.

INFRINGEMENT OF JOHN WILSON'S TRADE MARK, MASSACHUSETTS, U.S.A.

JOHN WILSON'S
BUTCHERS' KNIVES,
BUTCHERS' STEELS,
and
SHOE KNIVES.
TRADE MARK



REGISTERED IN ENGLAND,
WASHINGTON, U.S.A.,
AUSTRALIAN & OTHER
BRITISH COLONIES, &
GERMANY.

WORKS:—SYCAMORE ST., SHEFFIELD, ENGLAND. Established 1750.

ACKNOWLEDGMENT AND AGREEMENT.
WHEREAS, I, GEORGE A. ROBINSON, of West Mansfield, County of Bristol, State of Massachusetts, have heretofore manufactured and sold certain Knives bearing a Mark which is claimed to be an imitation of the trade-mark owned by John Wilson, of Sheffield, England, which consists of four peppercorns and a diamond, and I do hereby acknowledge my belief that I had the right to do so.

NOW, This, is to Witness, in consideration of the forbearance of the Representatives of the said John Wilson, to sue me for damages for the wrong aforesaid, I do hereby undertake and agree,

FIRST, to surrender and deliver to the Attorneys for the said John Wilson, all knives now on hand, and in my possession, or under my control, bearing the said imitation trade-mark, and

SECOND, I further undertake and agree to and with the said John Wilson, and his legal representatives, not to manufacture or sell, or cause to be manufactured or sold, at any time in the future, Knives or other Cutlery, bearing his trade-mark aforesaid, or any imitation or simulation thereof. IN WITNESS WHEREOF, I have hereunto set my hand and seal at West Mansfield, aforesaid, this thirty-first day of May, 1883.

WITNESS—
E. M. REED.
(Attorney for Defendant.)

G. A. ROBINSON. L.S.
J. A. WILSON
SHEARSTEEL
Mark



J. R. TORREY,
Manufacturer of Razor Straps & Dressing Cases,
Sole Agent for Worcester Cutlery Co.
Importer of Fine Razor Stones.

American Made Razors.
WARRANTED BEST CUTTERS IN THE WORLD.
J. R. TORREY RAZOR CO.
Factories: WORCESTER, MASS.
Send for Price Lists.

SPENCER & UNDERHILL,
94 Chambers Street, New York,
DEPOT FOR

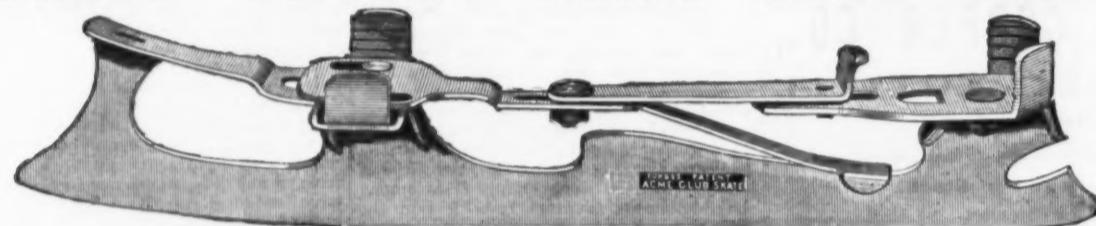
Germantown Tool Works' Warranted Hammers and Hatchets (Stamped Geo. Selsor & Co.)

Also, COLLIER'S SONS' AWLS.

American Screw Co.'s Wood, Machine, and Rail Screws, Stove and Tire Bolts, Rivets, &c.
O. Ames & Son's Shovels, Spades and Scops.
E. W. Gilmore & Co.'s Strap and T Hinges.
GENERAL

W. & S. Butcher's Chisels, Plane Irons, &c.
A. Field & Son's Tacks, Brads, Nails, &c.
Bridge, Brick Trowels.
G. F. Warren Co.'s Marriage Clamps.
Nicholson File Co.'s Files.
Russell Jennings' Auger Bits.
Richardson Bros.' Saws.
HARDWARE.

FORBES' PATENT ACME CLUB SKATE.



UNIVERSALLY ACKNOWLEDGED THE
BEST SELF-FASTENING SKATE EVER INVENTED.
Retains the First Place and Foremost Rank for Demonstrated Superiority.

DAME, STODDARD & KENDALL,
SUCCESSIONS TO
BRADFORD & ANTHONY,

SOLE AGENTS FOR THE UNITED STATES,
374 WASHINGTON STREET, BOSTON, MASS.
For Sale by all the Principal Dealers.

GEO. H. CREED,
SHIP CHANDLERY,
103 Reade Street, New York.
Manufacturers of and Wholesale Dealers in
Cotton and "Long Flax" Sail Duck,
Cotton and Linen Hawsers,
Creed's Patent Ships' Crews, Helmman's Wire Rope
Splinters, Agent for Raymond's American Crane Oil
for lubricating Cylinders and Valves.

ONEIDA ALARM TILL.
SUSCEPTIBLE OF OVER 100 CHANGES.
Better than any other Till in the market. No tampering with keys, as it alarms every time a key is touched, unless the alarm is disengaged. Send for prices and compare this Till with others in the market. No Till-tapping possible.

MANUFACTURED BY
THE ONEIDA ALARM TILL CO.,
EAST SYRACUSE, N. Y.



OFFICE OF
PHOENIX CASTER CO.,
Indianapolis, Ind.
MARTIN'S CASTER,

For heavy bedsteads, book-cases, flower stands, refrigerators, safes, sideboards, desks, or very heavy furniture. Also for heavy ice chests, magazine boxes, stove trucks, heavy showcases, beer boxes, or any very heavy weight. Especially adapted for use in beer bottling, fruit canning, tobacco or warehouse establishments, where heavily-loaded tables need to be moved.

Send for Catalogue.

Our Drawer is so uniform, simple, strong, and effective, that it has nearly driven all competition from the field.



WROUGHT IRON ADJUSTABLE
"Forty daily Trucks in use. Just what we wanted."
WASHINGTON STAMPING COMPANY,
Washington, Ohio.

STOVE TRUCK
TUCKER & DORSEY,
MANUFACTURERS,
INDIANAPOLIS, IND.



No.
19.
The Standard Lock in the Trade.

PAYSON'S PERFECT

Burglar-Proof

SASH LOCK.

LIFTS THE WINDOW
(in locking) evenly to its place.

SIMPLE AND STRONG.

PAYSON MFG. CO.,
CHICAGO.

FREDERICK MALLESON,
MANUFACTURER OF
FISHING REELS AND RODS,

Split Bamboo Rods, Hooks on Gut, Flies, Casting Lines, &c., &c.

JOBBERS ONLY SUPPLIED.

Send for Catalogue and Discount Sheet.

136 to 144 First Street, BROOKLYN, E. D., N. Y.

THREE PRIZE MEDALS.



PARIS, 1855.



PARIS, 1878.

MATTHIAS SPENCER & SONS,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,
of every description.

CORPORATE MARK.

SPENCER SHEFFIELD

Granted 1749.

W. & S. BUTCHER,

SHEFFIELD, ENGLAND,

Manufacturers of

Files and Edge Tools,

STAMPED

W. BUTCHER.

ALSO OF

RAZORS AND POCKET CUTLERY,

STAMPED

WADE & BUTCHER.

W. & S. BUTCHER,

Office in New York, 135 Duane St.

Patented Articles of
MALLEABLE IRON.

NEW pattern Heavy Screw Clamps

strongest in the market.



Hammer's Malleable Iron Oilers, 3 sizes.
Hammer's Mall. Iron Hand Lamps.
Hammer's M. I. Hanging Lamps.
Hammer's Adjustable Clamps.

For sale by all the principal Hardware Dealers.

Send for Price List.

MALLEABLE IRON CASTINGS

Of superior quality, and Hardware Specialties in

Malleable Iron made to order.

HAMMER & CO.,

Branford, Conn.

PAYSON'S PERFECT

Burglar-Proof

SASH LOCK.

LIFTS THE WINDOW
(in locking) evenly to its place.

SIMPLE AND STRONG.

PAYSON MFG. CO.,

CHICAGO.

FREDERICK MALLESON,
MANUFACTURER OF
FISHING REELS AND RODS,

Split Bamboo Rods, Hooks on Gut, Flies, Casting Lines, &c., &c.

JOBBERS ONLY SUPPLIED.

Send for Catalogue and Discount Sheet.

A.C. COES
PAT. DEC. 26, 1871.

Established in 1839.

A. G. COES & CO.
WORCESTER,
MASS.
Successors to
L. & A. G. Coes,
Manufacturers of
THE GENUINE
COES
Screw
Wrenches.

PATENTED,
May 9, 1871.
December 26, 1871.
December 26, 1875
August 1, 1876

The backstrain when the wrench is used is borne by the bar—not by the handle.
The strongest Wrench made, and the only successful Re-enforced Bar.
None genuine unless stamped

A. G. COES & CO.

Our Agents, GRAHAM & HAINES, 113 Chamber St., New York, carry a full line of our goods, and will be pleased to serve you at factory prices.

HILL'S
Eureka Dryer.

THE BEST
In the Market
For Indoor Use.
Also Manufacturers of
HILL'S
CHAMPION DRYER.

For illustration see last Iron Age Circulars and discounts to the trade on application.

HILL DRYER CO.,
Worcester, Mass.

PATENT APPLIED FOR.

TREE AND HEDGE TRIMMER.
Unsurpassed for cheapness and durability. It combines a perfect lever principle with a blade working in a slotted steel tool.
Send for illustrated circular and price list.

E. S. LEE & CO.,
164 West Main Street,
ROCHESTER, N. Y.

THE WIRE GOODS CO.,
Worcester, Mass.,
MANUFACTURERS OF

SHARP GIMLET POINTED

WIRE GOODS.

WIRE BENDING A SPECIALTY.

Wire Straightened and Cut to Length.

RIFLE MANUFACTURERS.
Dealers' Firm Names put on when desired.

GUNS
AND
PISTOLS.
WHOLESALE ONLY.

American and English Goods, Fishing Tackle, Winchester and Other American Rifles.

Manufacturers of Leather Gun Cases, Holsters, Bags and Clothing of Leather and Duck.

Dealers who visit us will always find Job Lots.

166 Main St., CINCINNATI.

B. KITTREDGE & CO.

BARNES' SAWS.

Complete Outfits for Workshop Business.

Lathes for Wood or Metal, at

CHARLES E. LITTLE'S,
(Eastern Agency, Factory Prices.)

69 FULTON ST., NEW YORK.

Descriptive Catalogue Free.

HALL & ELTON'S GERMAN SILVER.



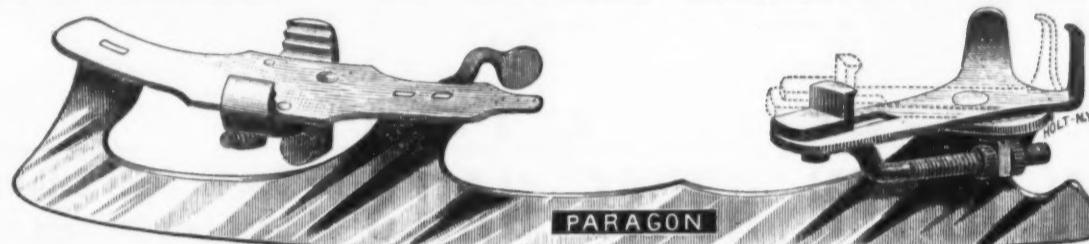
1883.

1837.

In addition to Spoons of this well-known brand, we are now prepared to furnish Forks of the same quality. We GUARANTEE these goods to be SOLID and of UNIFORM quality throughout, with no coatings to wear through or flake off, and with no liability to RUST.

HALL, ELTON & CO., Wallingford, Conn., and 47 East 13th St., New York.

THE PARAGON.



PARAGON

The Most Perfect ALL CLAMP LEVER SKATE Ever Made. NO TROUBLE IN ADJUSTING.

NEAT, SIMPLE, POWERFUL AND EFFECTIVE.

In its general use at the leading Rinks and Skating Lakes last season, it invariably received the highest testimonials of favor. Yet, notwithstanding these, we have improved some points, so there cannot now be a question as to its great superiority.

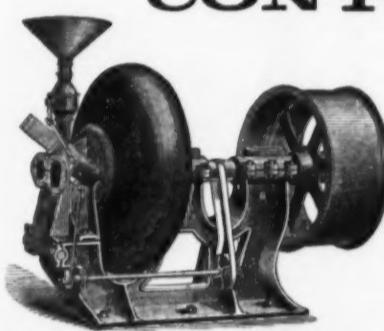
WE ALSO MAKE A COMPLETE LINE OF ALL OTHER KINDS OF SKATES.

W M. A. SUTTON,

MANUFACTURER,

522, 524, 526, 528 and 530 West 20th Street, - - - - - NEW YORK.

CONTINENTAL WORKS BROOKLYN, N. Y.



DUC'S Mechanical ATOMIZER Or Pulverizer.

For reducing to an impalpable powder all kinds of hard and brittle substances, such as QUARTZ, EMERY, CORUNDUM, GOLD AND SILVER ORES, BARYTES, COAL, OCHRE, MANGANESE IRON ORES,

PHOSPHATE ROCK, &c.

It is simple and not liable to get out of order. Revolving Shell being constructed of Siemens-Martin steel, and all parts mechanical in design and of first-class construction. Weight, 5,500 lbs. heaviest piece, 1,500 lbs. It will pulverize 7 to 10 TONS IN 10 HOURS with 30 H. P.

For Circulars and full particulars, apply to or address

THOS. F. ROWLAND, Sole Manuf'r, Brooklyn, N. Y.



THE HARTFORD HAMMER CO., Hartford, Conn.

HOWARD IRON WORKS,

BUFFALO, N. Y.,

Manufacturers of

BENCH VISES,

Price Lists sent on application.



J. E. QUACKENBUSH & SON
MANUFACTURERS OF
Porcelain, Mineral & Jet Knobs & Escutcheons.

Send for Price List
OFFICE,
525 5th Ave., N. Y.

for
dur-
any
com-
er-
in a
ok.
ated
price

THE PEACOCK PATENT
"SCREWLESS"

DOOR KNOBS AND SPINDLES.

A COMPLETE SET,
EXCLUSIVE OF ROSES,
COMPRISES BUT
THREE PIECES.



HALF-SIZE ILLUSTRATION OF D. X.
"SCREWLESS" KNOBS.

2½-inch, Porcelain Top,
Plated Mountings.

NO WASHERS,

NO SCREWS,

NO SCREW HOLES.

RIGIDITY.

ADVANTAGES :

ECONOMY.

PERMANENCY.



FULL-SIZE ILLUSTRATION OF "SCREWLESS" SPINDLE AND SOCKET.

Descriptive Circulars and Prices on Application.

SOLE MAKERS:

THE YALE & TOWNE MFG. CO.,

MANUFACTURERS, ENGINEERS AND MACHINISTS,

Principal Office and Works, STAMFORD, CONN.,

OWNING AND OPERATING

THE EMERY SCALE CO.,

BRANCH OFFICES :

THE YALE LOCK MFG. CO.,

NEW YORK, 62 Beale Street,
BOSTON, 22 Franklin Street,

THE WESTON CRANE CO.

PHILADELPHIA, 507 Market Street,
CHICAGO, 64 Lake Street.

ing, thus furnishing more water than allotted by the concession as already described. The locations of some of the openings were below those of others; thus, on account of the greater pressure upon the lower openings, they supplied a proportionately greater quantity of water. In several towers, pipes were attached to the openings without any gauge, but were so arranged that they could be enlarged or contracted at the will of the guardian. Another very reprehensible fraud on the part of the guardians was, when a concession changed hands, instead of using the old opening to supply the person obtaining the renewal of the concession, to pierce a new opening and to sell the water from the former for their own interest. Frontinus adds that the suppression of such a fraud should attract the special attention of the administrator of the water, for it is his duty to take care not only of the water, but also of the preservation of the towers, for the latter would be very soon ruined if holes could be arbitrarily pierced. In examining the condition of the different branches of lead pipes placed under the pavements, which circulated throughout the whole city, they were found to be pierced with holes in many places by an instrument called a "pointer;" the water flowing from these holes was sold by the purveyor for his own profit to all those wishing to arrange with him, the water being led from these openings by private tubes to the dwellings. A large quantity of water destined for public use was turned from its legitimate course in this manner, as Frontinus¹ proved by the increased amount received at the outlet of several pipes after the holes had been closed.

The labor required to preserve the aqueducts and to maintain a proper distribution of the water was performed by the men of two families of slaves. One family² belonged to the public, having been inherited from Agrippa by his father-in-law, the Emperor Augustus, who gave them to the State as already mentioned. This family comprised about 240 men. The second family, consisting of 460 men, belonged to the family of Cesar, and was established for this purpose by the Emperor Claudius when he built his aqueducts. These men were classified according to the work they were required to perform—into guardians of the water towers, inspectors, pavers, pipe makers and laborers. A certain number of these men were required to live outside the city, in order that they might be able to repair promptly any damage caused by accidents to the aqueducts, for although the damage might be slight at the time of occurrence, the force of the running water would very soon increase very materially any crevice in the masonry through which it might escape, and thus not only delay the supply of water to the city, but destroy the foundations of the aqueduct. Some of the guardians were lodged in the water towers. All the other men dwelt in the vicinity of the water towers and amphitheaters which were supplied with water, and were expected to continually hold themselves in readiness to aid in abating any damage caused by accident, and when necessary required, to aid in directing the supply of water ordinarily running to several districts at once into any special district requiring immediately a more abundant supply.

Frontinus tells us that he found that these men, through the negligence of the overseers, were accustomed to leave the duties required of them for the public good and to work for their own individual profit. To re-establish and keep order among so great a number of men as composed these two families,³ Frontinus required that the work to be performed on the morrow should be designated the previous evening; he also kept a record of the work performed each day.⁴ The men were paid by the public treasurer, and this expense was defrayed by the money paid for concessions of water. This amounted, in the time of Frontinus, to 250,000 sestertii⁵ annually; this revenue was often taken for other purposes. The Emperor Domitian used it for his own benefit; Nerva caused it to be returned to the public treasury. The expenses of the supply of water for Imperial properties were paid from the public treasury, as were also those for pipes and all expenses relative to the maintenance of the aqueducts, the water towers and reservoirs, or public fountains. The maintenance of the aqueducts was the especial care of the administrator, for they were exposed to many and frequent causes of damage, which it was necessary to foresee and prevent. Accidents were occasioned by the ravages of age, by exposure to intense cold and heat, by the violence of tempests, through the fault of badly-constructed work, and by the dishonesty of the proprietors of the fields adjoining the aqueducts, who fraudulently caused the water to escape from the channels in order to irrigate their land. Those portions of the aqueducts supported by arcades suffered most from the effects of age and the violence of the mountain storms. Where the arcades crossed the rivers the foundations were much exposed to the violence of the currents in times of floods. The channels in masonry along the flanks of the mountains were exposed to landslides and many other causes of accident. It was necessary to bring to the execution of all work required to prevent these accidents, and the consequent interruption of the supply of water, great activity, and to have the work performed with great care. The channels underground suffered less, not being exposed to the effects of intense cold or heat. Accidents to the channels could sometimes be repaired, while still maintaining the supply of water, by carrying it across or around the break, through a temporary channel made of lead pipes held at the proper elevation.

A frequent obstruction to the passage of the water was the gradual deposit of mud on the bottom and sides of the channel, which formed in time hard and thick incrustations, and which gradually narrowed the channel till the passage of the water was finally entirely prevented. Sometimes the

¹ Id., ch. cxv.

² Frontinus, ch. cxiv.

³ It will be remembered that *familia* (a family), means properly, the servants belonging to a common master.

⁴ Fr., ch. cxxiii.

⁵ This amounts to but \$8500 of our money, but the great difference of relative value must be taken into consideration.

mortar would drop out and permit the water to escape, which would damage the walls of the channel and the masonry supporting it. Only those repairs that were absolutely necessary were permitted during the heats of summer, so as not to interrupt the distribution of water at the season when its use was the most required. Spring and autumn were recommended for this work as the season most suitable, when the fresh masonry would not be exposed to the intense cold of winter, which would freeze the mortar before it was "set," nor would it be exposed to the heats of summer, which would absorb the moisture in the mortar and thus prevent it from forming a solid mass with the stones; for intense heat is as injurious as intense cold to fresh mortar. Moreover, there is no work which demands as much skill, precision and care as masonry required to prevent the escape of water; each piece must fit exactly according to the rules which most masons understand and few observe.¹ By preparing in advance all material required, and working with the greatest celerity, the passage of water was interrupted for the shortest possible period, and by working on but one aqueduct at a time, the city was not deprived of too great a quantity of water at once.

The administrators were empowered by the Senate, when repairs were to be made to the aqueducts, to procure earth, clay, stone, sand and wool from the adjoining fields and have them transported across the fields if necessary, the damages having been previously appraised. Fifteen feet were ordered by the Senate to be reserved on either side of the channels, no buildings or trees being permitted within that space except where the aqueducts were entirely under ground, when the space was reduced to 5 feet. This law had fallen into such disuse that proprietors often inclosed this ground within their fields and used it for their own convenience, building and planting upon it as they pleased, and making roads over it, and even going so far as to prevent the employees of the administrators of the water supply from visiting those portions of the aqueducts, and thus these constructions were, from want of proper and timely attention, gradually destroyed. The real and prime cause of the destruction of the aqueducts was the negligence of the administrators intrusted with the care of the preservation of these magnificent testimonials of the civilization of ancient Rome. The workmen appointed to attend to the repairs, profiting by the negligence and following the examples of their masters, neglected their allotted work and attended to private affairs. Pliny tells us that long before his time the city was deprived of the benefit of the water from the Marcia, the Julia and Virgo aqueducts; that the proprietors of the land adjoining the aqueducts had turned all the water to their own use; nevertheless, the water from these aqueducts continued to figure on the public register as amounting to 22,12 quinaria daily, exactly as if it were regularly received and distributed.²

It is evident from what has been said in regard to water supply that modern cities have not advanced beyond ancient Rome; indeed, in regard to abundance, no city has ever yet even contemplated supplying to its inhabitants such a large quantity. There was an abundant supply for every purpose; that which was used for drinking purposes was brought from a great distance, and its freshness was retained by bringing it through conduits of stone and keeping in covered reservoirs, where it was exposed to the action of the air, and at the same time protected from the rays of the sun. Great care was taken to prevent any pollution. As to the abuses in ancient Rome of the public water, it is not the place of the writer, nor his object, to remark upon them, or to make any comparison with those of modern times. Many of the larger cities of both the Old and New World have either recently imitated ancient Rome or are now contemplating so doing, by procuring their supply of water from long distances, from localities removed from all causes of pollution, and bringing it to the inhabitants by means of gravity through aqueducts.

TRADE PUBLICATIONS.

Presses, Dies and Special Machinery.

A very neat catalogue of some 4½ x 7 inches size, with nearly 250 pages has recently been issued by E. W. Bliss, the well-known manufacturer of special sheet metal working machinery, of Brooklyn, N. Y. As the work is intended for general circulation among those making use of machinery of this kind, it is of special interest to many of our readers. We shall refer to some of the leading features, from which all will be enabled to judge of its desirability as an addition to their collection of trade publications. The frontispiece is a general view of the factory, which faces Plymouth, Pearl and John streets, Brooklyn. The point of view chosen for the engraving shows in the background the New York end of the Brooklyn Bridge, and in the far distance some of the more prominent buildings on that side of the river. One of the early chapters treats upon setting up and operating power presses and setting dies. The directions are concise, and are arranged in just the form to be of the greatest service to those for whom they are intended. A large number of power presses for different purposes are then shown, accompanied by memoranda of the patents under which they are made—both American and English. A carefully worded statement of the capacity of each press and the work to which it is adapted accompanies the illustrations, as also particulars concerning dimensions, weight and price. Special machinery for wiring, card-cutting and some reducing presses for the use of silversmiths are also shown in the early part of the book. Power punching presses are then introduced, of which a very complete line is shown, adapted to almost all the purposes for which such machinery is employed. Many of the illustrations from this point in the book to the close are too large to appear on the size of page we have mentioned, and therefore are printed upon folded sheets.

A number of special machines shown have been illustrated in our columns, and are therefore somewhat familiar to our readers. Draw-

¹ Frontinus ch. cx.

² Pliny, lib. 31, ch. xxv.

H. D. SMITH & CO., Plantsville, Conn.

Manufacturers of the

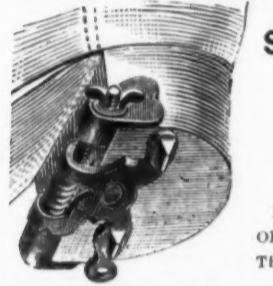
BEST QUALITY CARRIAGE MAKERS' HARDWARE,

Manufacture the Largest Variety of Forge Carriage Irons, of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

SAFETY REVERSIBLE ICE CREEPERS.

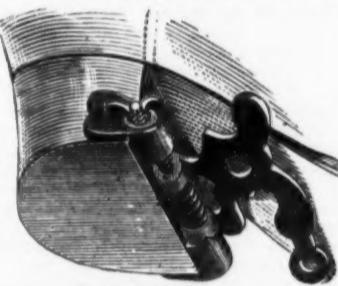


Safe.

Durable.

Cheap.

NOTHING TO TAKE
OFF WHEN ENTERING
THE HOUSE.



Not in Use.
Success Wherever Sold.

SOLID CAST STEEL



ALSO
ARCTIC
ICE

CREEPER.

Each Kind are Packed
Assorted Sizes.
Sample pair of either by
mail upon receipt of 60 cts.

SCOTT MANUFACTURING CO., Sole Patentees and Manufacturers,
BALTIMORE, MD., U. S. A.

MONTGOMERY & CO., IMPORTERS

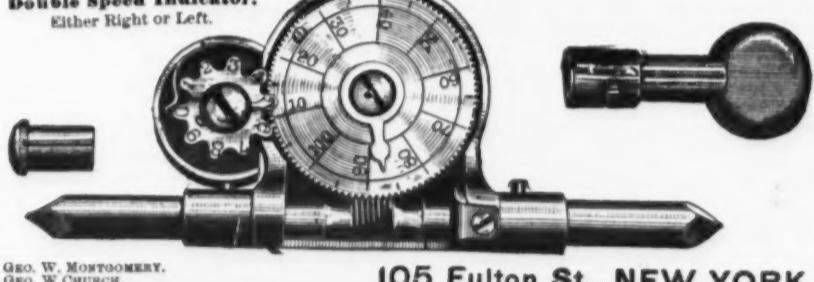
Stubs' Files, Tools and Steel, Grobet Swiss Files,
CHESTERMAN'S MEASURES,

Hubert's French Emery Paper, Horseshoe Magnets, &c.

WM. SMITH & SON'S CELEBRATED MUSIC WIRE, Nos. 2 to 30
French Sheet Steel, 3 1/4 in. wide, from 4 to 65 thousandths.

Machinists', Silversmiths', Jewelers', Die Sinkers' and Sewing Machine Manufacturers' Supplies.

PATENTED IMPROVED
Double Speed Indicator.
Either Right or Left.



105 Fulton St., NEW YORK.

Eureka Patent Shear

For Cutting Round and Flat Bar Iron and Sheet Metal.
MADE ENTIRELY OF CAST STEEL.

Cheapest and best tool for the purpose ever put on the market.

MADE IN TWO SIZES:

No. 1 will cut up to 3/4-in. Flat and 3/4-in. Round.
No. 2 will cut up to 1/2-in. Flat and 1/2-in. Round.

Send for Descriptive Circular.

EUREKA SHEAR CO.,
511 Market St., Philadelphia, Pa.



Henderson's Patent Gas Furnace,
Realizes Perfect Utilization of Coal as Fuel,
PRODUCES INGOT IRON FREE OF CARBON and
INGOT STEEL OF ALL GRADES OF CARBON,

From every kind of Pig Iron or Pig and Wrought Scrap Iron.

Apply to JAMES HENDERSON,
BELLEVILLE, CENTRE CO., PA.

NEW HAVEN HORSE NAILS

ARE THE BEST IN THE WORLD.

SEND FOR SAMPLES AND PRICES TO

RUNYON & HALLETT,

103 Chambers St., New York,

AGENTS FOR THE WEST.

WILEY & RUSSELL MFG. CO.,

GREENFIELD, MASS.,
THE GREEN RIVER TIRE UPSETTER.

LIGHTNING SCREW-CUTTING MACHINERY AND TOOLS, BOLT CUTTERS.

Both for Hand and Power Use, in great
Variety.

THE CELEBRATED LIGHTNING
SCREW PLATES,

Green River Upright Drilling
Machines, Thoroughly Made
and of the Best Patterns.

Punching Presses, Tire Upsetters,
Tire Binders, Measuring Wheels,
Fire Taps and Dies, Reamers, Countersinks
and various other Labor-Saving Tools.

Send for Illustrated Price List.

STEEL CASTINGS FROM OPEN HEARTH METAL.

We wish to give special attention to making Cast Steel Rolls of all sizes, Mill Gearing wherever Cast Steel is suitable. Also Cranks, Cross Heads, Shafts, &c., for Steam and Blowing Engine construction.

Being desirous of securing a share of public patronage, we will endeavor to make our product equal in quality to any in the market.

MACKINTOSH, HEMPHILL & CO., Limited,
PITTSBURGH, PA.

SOLID STEEL CASTINGS,

FROM CRUCIBLE and OPEN HEARTH.

HYDRAULIC CYLINDERS AND GEARING SPECIALTIES.

Special Attention given to the production of Tough, Sound, Smooth Castings, true to Pattern and Uniform in Quality.

GUN METAL ROLLS, PINIONS and CASTINGS.

AIR-FURNACE REFINED MALLEABLE CASTINGS.

All Stock used by us is subject to Chemical Analysis in our own Laboratory.

ISAAC C. JOHNSON & CO.,

Established 1853. SPUYTEN DUYVIL, NEW YORK CITY.

The Common Sense Sash Holder
and Lock Combined.

Patented March 6th, 1883.

I am the sole owner
of this patent, and
the manufacturer
of these fasteners,
and we think has
the largest sale. It
holds the window at
any position, and is
the same when
down, and entirely
prevents windows from
rattling.

I am the sole owner
of this patent, and
the manufacturer
of these fasteners,
and we think has
the largest sale. It
holds the window at
any position, and is
the same when
down, and entirely
prevents windows from
rattling.



H. A. WILLES,
MANUFACTURER AND DEALER IN HARD-
WARE SPECIALTIES,
727 Market Street, PHILADELPHIA, PA.

CURTIS
PRESSURE
REGULATOR,
FOR
STEAM and WATER,
is made entirely of metal
occupies the same space as a
globe valve. It has no
glands or packing, and is a
lock-up valve. Write for
Circular. Manufactured by
Curtis Regulator Co.,
61 Beverly St., Boston, Mass.
General Agencies: 109 Library St., Yonkers, N. Y.; 101 Market St.,
Philadelphia, Pa.; 101 Market St.,
Chicago, Ill., and cor. Halli-
more and Saratoga Sts., Balti-
more.

COBB & DREW
Plymouth, Mass.,
Manufacturers of Copper, Brass and Iron Rivets;
Common and Swedish Iron, Leathered, Carpet, Lace
and Gimp Tacks; Flushing, Hungarian, Trunk,
Cloth and Cigar Box Nails, &c. Rivets made to
order.

NEW YORK AGENCY,
GRUNDY & DISOSWAY,
HARDWARE,
165 GREENWICH STREET,
Agents for the Philadelphia Star Carriage and Tire Bolts.

ROMER & CO., Manufacturers of Patent Jail
Padlocks, Brass and Iron Padlocks, Carriage
Lamps and Lanterns, 21 to 42 Summer Avenue,
Newark, N. J. Illustrated catalogues sent to the
trade on application.

HOW TO
KEEP
BOILERS
CLEAN
FREE Book SENT TO ANY ADDRESS
By Jas. F. Hotchkiss 84 John St., N.Y.

John McLean,
Manufacturer of Ayers' Hydrants,
Stop Cocks & Calvan
and Cemetery Supplies,
39 & 30 Monroe St., N. Y.



A. WYCKOFF,
Manufacturer of



WOOD WATER PIPE
FOR
MINES, COKE OVENS AND
WATER WORKS.

**Chain Pump Tube,
Curbs, &c.**

ELMIRA, N. Y.

R. COOK & SONS,
Manufacturers of

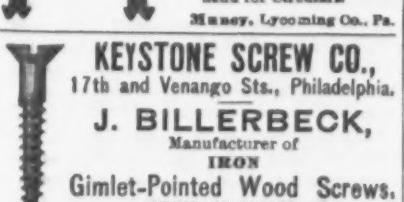
Carriage & Wagon AXLES,
WINSTED, CONN.
ESTABLISHED - - - 1839.

N. Y. MALLETS and HANDLE WORKS



MALLETS,
Hawking Beetles, Hawsing and Calking Irons ;
also all kinds of Handles, Sledge, Chisel and Hammer Handles, Axes.

COTTON AND RALE HOOKS,
Patented, Dec. 1877 ; a new combination of Hooks.
456 E. Houston St., New York City.



Vulcanized Rubber Fabrics ADAPTED TO MECHANICAL PURPOSES. RUBBER BELTING and PACKING.

Machine Belting,
Steam Packing,
Leading Hose,
Suction Hose,
Grain Elevators,
Steam Hose,
Piston Rod Packing,
Gaskets and Rings,

This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Armor, Dole, and Chicago, Vicksburg, Etc., for the Central, Hudson River, R. R., the great Elevators of the Penna., and Erie Railroads, of Jersey City and Hoboken, Dow's Stores, of Brooklyn, and many others; in fact, the largest Belts for the largest Elevators in the world.

A single carrier belt in the Penna. R. R. Elevator is over 200 feet long, weighing 15,000 pounds, and has run perfectly from the start.



Vacuum Pump Valves,
Ball Valves,
Car Springs,
Wagon Springs,
Gas Tubing,
Machine Belting,
Billiard Cushions,
Emery Wheels.

LINEN and COTTON HOSE.



Plain and Rubber Lined.
Circular Woven-Seamless Antiseptic RUBBER LINED "CABLE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carboided Duck, for the use of Steam and Hand Fire Engine Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c.



Pat. July 1873.

Emery Wheels and Packing.
ORIGINAL

Solid Vulcanite
EMERY WHEELS

LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.

The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, etc. These wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Safes, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small Machinery of almost every description.

Pat. Jan. 26, 1869.

PATENT ELASTIC
Rubber Back Square Packing,
BEST IN THE WORLD.

B represents that part of the packing which, when in use, is in contact with the piston rod. A is the elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight, and yet creates but little friction.

This Packing is made in lengths of about 20 feet, and of all sizes from $\frac{1}{4}$ to 2 inches square.

Corrugated Rubber Mats and Matting,

For Halls, Flooring, Stone and
Iron Stairways, &c.

RUBBER MAT

This practical and indispensable article—especially for wear where exposed to ice, snow or slush—was first introduced by this company several years ago, and its real value is in being almost indestructible, when proper materials are used in its manufacture, whilst the cheap, inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle and crumbles to pieces. Address

NEW YORK BELTING & PACKING CO.,
Warehouses, 13 & 15 Park Row (Opposite Astor House), New York.

JOHN H. CHEEVER, Treasurer.

Pat. July, 1875.

BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of
Shank, Socket Firmer and Socket Framing Chisels.

PLANE IRONS.

CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons, who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our trade-mark also "Riverlin Works."

PHOSPHOR-BRONZE

FOR

BEARINGS, SLIDE VALVES, CYLINDER RINGS,
CROSS-HEAD GIBBS, STEPS, BUSHINGS,

And all purposes where Maximum Durability, Anti-Frictional

and Non-Cutting Qualities are Desirable.

PUMP RODS,

BOLTS & NUTS,

MACHINE and WOOD

SCREWS, &c., &c.

Combine Toughness, Strength, Durability and

Resistance to Corrosion.

TRADE MARKS

The Iron Age

AND
Metallurgical Review.

New York, Thursday, November 8, 1883.

DAVID WILLIAMS, Publisher and Proprietor.
JAMES C. BAYLES, Editor.
JOHN S. KING, Business Manager.

RATES OF SUBSCRIPTION, INCLUDING POSTAGE.

THE UNITED STATES, BRITISH AMERICA AND
SANDWICH ISLANDS.

Weekly Edition \$4.50 a year.
Issued every THURSDAY morning.
Semi-Monthly Edition \$2.30 a year.
Issued the FIRST and THIRD THURSDAY of every month.
Monthly Edition \$1.15 a year.
Issued the FIRST THURSDAY of every month.

TO ALL OTHER COUNTRIES,

PER ANNUM, POSTPAID.

Weekly Edition \$1.00—\$1—25 francs—20 marks—12 florins—6 roubles (coin)—3 lire—30 pesos.
Semi-Monthly Edition \$2.50—\$1—12½ francs—10 marks—6 florins—3 roubles (coin)—12½ lire—30 pesos.

Monthly Edition \$1.25—\$1—64 francs—5 marks—florins—1½ roubles (coin)—6 lire—5 pesos.

REMITTANCES

should be made by draft, payable to the order of David Williams on any banking house in the United States or Europe; or, when a draft cannot be obtained in postage stamps of any country.

NEWSDEALERS OR BOOKSELLERS

In any part of the world may obtain *The Iron Age* through the American News Company, New York, U. S. A.; the International News Company, New York, U. S. A., and London, England; or the San Francisco News Company, San Francisco, Cal., U. S. A.

RATES OF ADVERTISING.

One square (12 lines, one inch), one insertion, \$3.00: one month, \$7.50; three months, \$15.00; six months, \$30.00; one year, \$40.00; payable in advance.

BRITISH AGENCY.

Office of THE IRONMONGER, 448 Cannon St., London.

**DAVID WILLIAMS, Publisher,
83 Head Street, New York.**

PITTSBURGH 77 Fourth Avenue.
Jos. D. WEEKS, Manager and Associate Editor.
PHILADELPHIA 320 South Fourth Street.
THOS. HOBSON, Manager.
CHICAGO 36 & 38 Clark St., cor. Lake.
J. K. HANES, Manager.
CINCINNATI 13 West Third Street.
HENRY SMITH, Manager.
CHATTANOOGA Eighth and Market Streets.
R. S. LOWE, Manager.

SOLE AMERICAN AGENCY FOR THE IRONMONGER,

Published at 448 Cannon St., London.

The oldest and leading representative of the British Iron and Hardware Trades.

Subscription, Postpaid \$5.00

to countries outside of Great Britain, including Monthly Foreign Supplement of one copy of Iron Monger's Diary.

By arrangement with the two journals, subscriptions to both will be received by either *The Ironmonger* or *The Iron Age* on the following terms:

THE IRONMONGER and THE IRON AGE, Weekly.
In the United States and Canada \$7.50 or £1. 10s.
In Great Britain and Ireland 5.00 or 1. 10s.
In other countries 6.00 or 1. 10s.

THE IRONMONGER, WRIGHT and THE IRON AGE,
Monthly.

In the United States and Canada \$6.75 or 12s.

In Great Britain and Ireland 5.25 or 12s.

In other countries 6.75 or 12s.

Thirty-Five Dollar Steel Rails.

In December, 1877, American steel rails were for the first time sold as low as \$40 per ton. In 1878 prices were from \$1 to \$3 higher, and in 1879 the "boom" set in, carrying rails to \$85, from which they steadily fell until the forty-dollar point was again reached in December of last year—just five years from the first time. Ever since they were last sold at \$40 there has been a general feeling that the decline in price would continue until it touched \$35. This point was reached last week, several companies contracting to deliver rails during the winter at the low price named. The decline from \$40 to \$35 thus occupied eleven months, although the last two dollars were taken off quite suddenly, the companies quoting \$37 within the past week. It must be said, however, that an attempt is being made by some of the steel-rail manufacturers to prevent the thirty-five dollar rate from becoming the general quotation. They report themselves as refusing to take orders below \$37, and intimate that if they cannot get that price they will probably close their mills when they complete present contracts. The companies which have sold rails at \$35 claim to have done so for the purpose of keeping their mills running full all the winter, and insist that no more rails will be sold at that price. It remains to be seen, however, whether rates can be advanced after having been lowered, without a revival of the demand, which would itself cause a rising market. There are other orders to be placed by railroad companies, which always buy as low as any, and it will be marvelous indeed if they pay over \$35.

The price now named seems ruinously low when compared with the figures which have recently prevailed. Yet the mere fact that it is the lowest price that American steel rails have ever touched does not alone warrant the conclusion that the "bottom" has been reached. It must be remembered that iron rails sold as low as \$32.50 in October, 1877, and iron rails cost fully as much to manufacture as steel rails do. It therefore seems that there is still a lower depth which might be sounded before "bottom" can actually be claimed. There appears to be no difference of opinion among members of the steel-rail trade, as well as those connected with the general iron trade,

concerning the effect of this reduction. All agree that it is injurious, if not disastrous. If \$35 or any lower rate prevails, not only will profits be almost wholly swept away, but none save the richest steel-rail companies can continue to do business. If all the mills are kept running under such circumstances, it will only be a question of financial endurance, which will eventually be decided by the sheriff. The other branches of the iron and steel trades cannot regard the course of the steel-rail market with indifference. As the price of rails goes lower, so will other prices sympathetically decline. The fall may not be so great, either absolutely or in proportion, but, nevertheless, the tendency will be in that direction. Not only pig iron, but other iron and steel products, will probably be affected to some extent.

We elsewhere present a report of some interviews which representatives of this paper have held with the agents in this city of some of the leading steel-rail companies. It will be observed that the reduction to \$35 was caused by the failure of the companies to agree to restrict production uniformly. Evidently some of the companies deemed themselves sufficiently well equipped in every respect to compete successfully with their rivals, and therefore determined to secure enough work to keep their mills fully employed. If it had not been for this spirit of combative ness there would have been no contest over comparatively small contracts, for which prices should have been maintained at \$37, in view of the much larger orders which were coming on the market. But now all efforts to sustain prices have failed, and the result is that the companies which can continue to run will compete more sharply for low-priced and profitless business than they ever did for big orders in the days of fat profits.

Troubles of Importers.

The lot of an importer is not altogether a happy one. It seems to be a simple matter, when duties and prices are favorable, to purchase iron or steel abroad, have it shipped to this country, and sell it to somebody who needs it. It is a process as plain and as easily understood as a retail grocer's transactions, apparently depending on the ability to buy at a price which will net a fair profit on the sale. For months and years, when trade is brisk, importers will handle foreign goods in great quantities, and pile up their gains in a manner very aggravating to domestic manufacturers, who would prefer to have the field to themselves. But the importer knows too well, from unpleasant experience, that there are all sorts of trouble-some matters to contend with in the effort to secure business, and when prices are very low it takes unusual caution and vigilance to guard against heavy losses and at the same time continue to buy and sell.

The question of the correct rate of duty is often very serious matter to an importer who is seeking to do business sanctioned by the law and has no intention of evading its provisions. If the Treasury Department decides a disputed rate within a reasonable time after it is appealed to, there is no harm done; the importer pays the rate fixed, and, if the duty is not prohibitory, he proceeds with his business. But it sometimes happens that months elapse between an appeal and a decision, as in the recent iron wire rod case, and in the meantime nothing can be done. Domestic manufacturers are not benefited, because their customers refuse to buy until they know whether prices will be lower in consequence of a decision in favor of low duties, while importers are injured in being absolutely prevented from making any sales, because they are not sure what duty they will have to pay. Four months were thus lost in the iron wire rod trade during the present year. It occasionally happens that the customs authorities levy a higher rate of duty on an article than the charges obviously intended by the law, claiming that it is something different from what it purports to be. The matter must then be appealed to the Treasury Department, involving considerable delay, and possibly an expenditure for counsel fees.

If an importer appeals from the decision of the Treasury Department to the courts, he undertakes a very serious piece of business. He is obliged to pay the whole duty levied, and sue the Government for recovery of the excess over the rate which he claims to be applicable. He receives the goods and can dispose of them, it is true, but he is in doubt as to their cost until the decision by the court, which may not be made for a year or two after the filing of the protest. If he can sell at a rate to cover the duty he has paid he is very fortunate, but his customers will probably demand compensation in view of the possibility of the court deciding in favor of the lower rate of duty. Such was the cotton-tie case of recent memory. Domestic manufacturers were not benefited by the delay in the legal proceedings, for no cotton ties were purchased from them, but importers were seriously affected, owing to the uncertainty attending their transactions, besides having large sums of money locked up in the possession of the Government until the final decision.

With 300 miles of water between us and Great Britain, it may be presumed that business cannot always be conducted with ease, celerity and satisfaction. Steamships ply between the two countries very regularly, it is true, and the telegraph furnishes almost immediate communication between the American importer and the European manu-

facturer or shipper, but in spite of these facilities and auxiliaries the course of business is often anything but smooth.

We present a case in point. At existing rates it is not profitable to purchase ordinary English pig iron for consumption in the United States and pay the usual freight rate. The low price of American pig iron, conjoined with the duty, cost of insurance and ocean freight, prevents such a commercial undertaking. But if an importer has a customer who desires English pig iron, it is sometimes possible to charter a vessel at a rate which will net a profit of a shilling or so per ton on the transaction. An opportunity of this kind recently presented itself to an importer in this city. The ship, when chartered, was at a west-side Scotch port. The importer contracted with his customer to deliver the iron in October. The vessel sailed for the Northeast of England early in the month to load the iron, but met with an accident on the way, and was obliged to return for repairs. After some delay another vessel was found to take her place. On arriving at the port of shipment, two lighters were sent out to her with the pig iron, but one of them capsized and was sunk with 300 tons on board. The other lighter reached the vessel safely. As no more time could be lost, on account of prior engagements, the ship sailed for New York without waiting for another lot of pig iron to take the place of that which was lost. The iron did not arrive here in October, and the purchaser demanded of the importer \$1 a ton damages for its non-delivery in the specified time. The English shippers, on being apprised of the circumstances, offered to make an allowance of 6d., or 12 cents, per ton, which they thought would be a satisfactory arrangement!

A number of instances have occurred in which importers have suffered serious loss from the shipment to them of pig iron inferior to the kind ordered. In such cases, as the iron is paid for as soon as it is reported shipped, the importer is obliged to pay damages or to take back the iron and sell it for whatever it will bring. His chances of recovering from the foreign shipper are very slim. When times are good and prices are high, and profits are correspondingly expanded, occasional mischance and afflictions are borne with ease; but when prices are low and business is light, profits are microscopic, and comparatively trifling difficulties seriously interfere with the satisfactory progress of business. Iron and steel importers are therefore decreasing in numbers with the decline of values, and those who are left are anxiously looking forward to the termination of this season of dullness and the reappearance of the brisk times in which they garner their profit.

The National Gun Foundry Board.

The members of the National Gun Foundry Board, consisting of Commodore Simpson, of the United States Navy; General Abbot, of the Engineers; Colonel Baylor, of the Ordnance Department; Major Elder, Captain Mathews and Lieutenant Jacques, returned last week from an extended European tour of inspection of foreign steel works and gun factories. The purpose of their tour was to consider the feasibility of establishing in this country a national gun foundry for heavy ordnance, and make report thereon to the Secretary of War. Woolwich Arsenal, the Sheffield Steel Works, Armstrong's works at Newcastle-on-Tyne, the Hotchkiss Works, near Paris, Terre-Noire and Creusot, the works at Angoulême and near Lyons, were all visited, and a sub-committee consisting of General Abbot, Captain Mathews and Lieutenant Jacques went to Russia to inspect there the Government works at Aboukoff.

As might have been expected, the members were not admitted to the Krupp works, that concern still keeping up the farce of making believe that there is yet some secret not known to American manufacturers to be guarded in their establishment. The visit to Woolwich, we presume, was one of mere courtesy—for if the board knew anything at all, they must for a surety have known that the obsolete rattle-traps of that institution could have interest only to antiquarians, but certainly none to those in search of information in regard to the manufacture of modern heavy ordnance. If a national gun foundry is indeed wanted, which we must be permitted to question, Congress would do well to apply to our manufacturers for first information on the subject. There is no question that if the Ordnance Department only knew themselves what they wanted—that is, were capable of turning out an intelligible steel specification—there could be found plenty of American works to respond to an invitation for bids.

"In order to see aright, one must know where to look," and there is no sense in sending abroad a detail of army officers who know absolutely nothing about steel manufacture to study foreign practice before they know anything about American practice. The report of this board will be looked for with peculiar interest by our manufacturers, and as it may be given to Congress before the steel practice of the world is entirely changed again, we may yet have an opportunity to lay the document before our readers.

Four cars on the Brooklyn Bridge were damaged last Saturday by a collision at the New York terminus. At that time trains of two cars each were running at three-minute intervals. There was the usual trouble about

the "grip" of the train which was about to start from New York. The train from Brooklyn came in and was run on the switch; the clearance not being sufficient, the rear platform of the last car projected, so that when the following train came in it was struck by the forward car and driven ahead on the track. The platform was broken into splinters, pieces of iron and glass flying in all directions. The rear brake-wheel of the stationary car was badly broken and the iron rails twisted. The blame for the collision is now thrown on the conductor of the telescoping train, who, however, claims that the brakes did not work, and that he was unable to release the grip from the rear car, which pushed the forward car upon the standing train. Luckily, nobody was seriously injured, and the trains were delayed about half an hour. We have thus far abstained from any remarks in reference to the bungling work in the construction and fitting up of the grip machinery and the laying out of the switches on the termini of the bridge. The incompetency displayed in this work has been so phenomenal that it could scarcely be considered a proper subject of scientific criticism. Now, however, when it is evident that this combination of blunders is endangering the lives of passengers, we desire, in a thoroughly friendly spirit, to call Colonel Paine's attention to the fact that there is a point at which mistakes of this character invite, and are likely to receive, consideration by the Grand Jury.

Valuation of British Steel.

The Sheffield correspondent of the London *Ironmonger* for October 13 makes the following remarks concerning British exports of steel from Sheffield to the United States:

How the aspect of the steel trade with our Transatlantic customers has changed within the last two years may be gathered from the fact that, while in 1881 the average value of the steel shipped to American ports was something like £28 per ton, during the present year it is nearly £29 per ton. The average value of the great bulk of the cast steel shipped to the States may be taken to range from £40 to £50 per ton, so that some idea may be obtained of the quantity of Bessemer being sent now as compared with two years since.

Inasmuch as our new tariff has changed the method of levying duties on low-priced steel from specific to ad valorem rates, this statement has suggested to us a comparison of the average value of the total exports of British steel to this country for the first nine months of the present year with the average value of the exports in September, for the purpose of ascertaining whether there is any indication of the undervaluation which our manufacturers feared would be the result of the new duties. In the nine months referred to the exports were 25,564 tons, valued at £383,148, which is an average of about £15 per ton. In the month of September the exports were 966 tons, valued at £26,980, which is an average of about £28 per ton, or almost double the average value for the nine months. Of course, these figures are not to be relied upon except for the general inference, as they cover blooms, and, possibly, rail ends and scrap steel, as well as crucible steel. Details of the values of the crucible steel alone might show a somewhat different result. But there is not in these figures the slightest indication that sweeping undervaluations are being made. If there was any systematic effort of that character it is reasonable to suppose that the British figures would be manipulated as well as those which are reported to our custom houses.

The comparison we have made also shows that the British steel sent to this country is now being restricted to the better—and, therefore, higher-priced—qualities. Ordinary Bessemer and open-hearth steels are being shut out of this market, as, if they were not, the average value would be much lower than £28. The comparison we have made also shows that the British steel sent to this country is now being restricted to the better—and, therefore, higher-priced—qualities. Ordinary Bessemer and open-hearth steels are being shut out of this market, as, if they were not, the average value would be much lower than £28.

Officers and Gentlemen.

There is a very general opinion among mechanical engineers that there is an "original vacancy" to be filled in the faculty of the United States Military Academy at West Point—the chair of Courtesy and Good Manners. By the army regulations officers are presumed to be gentlemen, and their conduct is considered reprehensible only when it is "unbecoming an officer and a gentleman." We regret to say, however, that within the past week the Commandant at West Point has given a conspicuous illustration of the fact that a man may be an army officer without at all times doing what would be expected of a gentleman in civil life.

The facts of the case are briefly these: The committee having in charge the arrangements for the late meeting of the American Society of Mechanical Engineers planned a pleasant excursion over the West Shore road to Kingston and return. As West Point was to be twice passed, it was thought that a brief stop to afford the members a chance to look at the museum and library would be pleasant. They were told, however, that permission would be necessary, and a polite note was written to the Commandant, requesting that such permission be extended. Meantime the management of the West Shore road had arranged the time-table for the special train, providing for a stop of one hour at West Point on the return trip. On Thursday last a curt letter was received from the Commandant, refusing the permission asked for, on the ground that the visit of so large a body of excursionists would seriously demoralize the cadets and interfere with their studies. The plan was then dropped, and

the Superintendent of Motive Power of the West Shore road, who had arranged the excursion, was asked to give the party the benefit of the hour that was to have been spent at West Point, by bringing them back to New York that much earlier. He replied that he could not rearrange his time-table, but that he had secured from the Commandant at West Point the necessary permission for the party to stop, as originally intended.

When West Point was reached on the return run from Kingston, the promised stop was made. All but a few of the excursionists left the cars and wandered around in a purposeless way. There was no one at the station to meet or conduct them, and not one representative of the United States Military Academy made his appearance. Not knowing where to go, they straggled back to the cars and sat out the hour of waiting with as much patience as could be expected under the circumstances. Considering the fact that this is a society of national importance, and that its membership includes gentlemen of the highest professional standing, it must be admitted that they received very shabby treatment at the hands of the "officers and gentlemen" of West Point. Such a letter as was sent their committee is what might be expected in the way of a stereotyped reply to like requests on behalf of average Sunday-school picnics, but it was very different from what the American Society of Mechanical Engineers had a right to expect, and to ignore the party after according permission to stop the train was even more an offense against good taste than the refusal of permission would have been. Considering the eagerness of army officers to appropriate and monopolize the testing machine which one of the members of this society designed and built, it would have detracted nothing from the dignity of the "officers and gentlemen" of West Point to have treated the society with common civility. Should any of them fit to attend meeting of the society, with or without invitation, we can promise them chance to see what the members consider conduct becoming engineers and gentlemen.

Course of the Tin Plate Markets.

Strange to say, although everything seems to favor the position of tin plates just now, the course of prices has been a great disappointment to holders for a month or two past. The demand has been good—sufficiently so to easily absorb the ample importation and leave us with light stocks in port; yet prices have shown little strength, in spite of their being well upheld in Wales and Liverpool, and notwithstanding the well-known fact that makers in Wales have their hands full to cope with the growing demand from all quarters, which promises to suffer little or no abatement for months to come at ruling prices. Our import during the first seven months was as under:

	1882.	1883.

<tbl_r

other from Messrs. William H. Wallace & Co., of this city, representatives of John Brown & Co. and Charles Cammell & Co., of England. The contract was awarded to Messrs. Wallace & Co., at £110 per ton, exclusive of duty, an 11½-inch test plate to be first delivered at New York, and, if satisfactory, the contract to be completed by supplying the required number of plates of the same quality. The contract is not a large one, except in the single particular of the size of the plates, most of which are very large and heavy. The largest are over a foot thick, about 6 feet wide, from 15 to 18 feet long, and will separately weigh as much as 20 tons.

The Navy Department is not a subject of criticism for having placed this contract abroad, as none of the steel works in this country possess the appliances for the manufacture of plates of this size. Messrs. Wallace & Co. are well-known and highly-esteemed merchants of this city, who have for years represented such firms as Henry Burden & Son, Charles L. Bailey & Co., the Central Iron Works, &c. They are not importers or agents of foreign manufacturers, in the ordinary sense of the terms, and act in this matter for the best interests of the Government, as well as their own individual interests. Of course, Congress may well be criticised, and even severely criticised, for not making adequate provision for the manufacture in this country of steel armor-plates, steel guns and all other necessary paraphernalia for war, but it does not seem possible to secure a majority of that body to favor a policy which will put this country on an even footing with the first-class powers of the world in matters relating to war, whether it be for offensive or defensive purposes. A beginning has, it is true, been made toward the rehabilitation of the navy, but it remains to be seen whether the next Congress will proceed further in that direction, or whether it will not, from partisan motives, obstruct the movement and interpose more years of delay before the navy of the United States will be worthy of mention among the navies of the world. The highest patriotic motives should animate all of our representatives who have anything to do with these matters, while picayune economy and blind partisan bias should both be overwhelmingly condemned when arrayed in opposition to national progress.

The Decline in the Price of Steel Rails.

Believing that our readers would be interested in the facts connected with the recent abrupt and serious tumble in the price of steel rails, we herewith present a report of some interviews which representatives of this paper have held with leading members of the steel-rail trade, in which will be found explanations of the causes of the decline, and opinions upon its extent and effect.

The first gentleman called on was Mr. B. G. Clarke, of the Lackawanna Iron and Coal Company, with whom the following conversation was had:

"Is it true that you have sold 30,000 tons of steel rails at \$35?"

"Yes. We have sold them at that rate for winter delivery. We do not propose to sell any more at that rate, and do not think we will have to. That fills us up for the winter, and prices will then, we think, be able to take care of themselves."

"Was this low sale the result of competition, or did you think the time had come for lower prices to be named?"

"We found that all the efforts to sustain prices at \$35 were destined to fail. All sorts of plans were tried to get the various companies to agree to uniformly restrict their production, but none would work. One company caused all the trouble. We then found that other companies were taking orders at \$35, and we concluded to do the same."

"Was the failure to agree upon restriction caused by an Eastern or a Western steel-rail company?"

"It was the fault of an Eastern concern. I tried my best to fix up matters satisfactorily, but it was of no use."

"What will be the result of the failure of efforts to sustain prices and the fixing of the thirty-five dollar rate?"

"It will lead to very severe competition, and the end will be 'the survival of the fittest.'"

"What effect do you think this will have on the other companies?"

"They will all have to sell at the same price; they cannot maintain their price at \$35; they get \$35 for some lots, but they could not get it except in a small way. The large orders are being held in abeyance until prices are fixed. The Pennsylvania Railroad Company, for instance, want 65,000 tons of rails; they would not buy until prices got down to hard pan."

"Do you think this reduction in the price of rails will make any difference in the price of pig iron?"

"No, I think not. My impressions are that pig iron is down to hard pan. In fact, I think there are enough furnaces stopped now to hold prices where they are. Stocks are being reduced all the time, and there is no object at all to cut prices. We shipped more pig iron from Hoboken last month than we ever have before, and we have been increasing right along for months. Our stock at the furnace has decreased 7000 tons in the last two or three months."

"Do you think this reduction of steel-rail prices to \$35 per ton will be about the lowest?"

"I should say so. I should hardly think steel rails would go any lower than \$35. We do not care to take any more orders; only just sufficient to keep us running through the winter. Well-organized concerns can just about live now. They are not paying any great dividends, but they will not break if they are well organized."

Mr. George A. Evans, sales agent for the Bethlehem Iron Company, was next interviewed. Mr. Evans was asked whether he

had heard of the sales of steel rails at \$35 per ton. "It is really a fact that there have been sales of rails at \$35 a ton. I do not want to sell any at that rate, however. There are really more selling at \$37 than at \$35. I have not sold any at \$35. I think, though, that \$35 is low enough to go. Of course, if we wanted to sell any rails, we could only get \$35. We are not pushing any work. If any steel-rail concerns want to put in orders for next year they have got to come down to \$35."

"Have you any idea what the immediate cause of the decline was?"

"There was a pretty decided feeling that rails were being sold by several parties at low rates. Mr. Clarke did not make the first reduction. You cannot find out who did it."

"In other words, Mr. Clarke announced openly what others were doing quietly?"

"That is it; certainly."

Mr. C. H. Odell, sales agent of the Pittsburgh Bessemer Steel Company, Limited, was then visited, and the following brief conversation ensued:

"What do you think of this reduction of the price of rails from \$37 to \$35?"

"I think it is a disgustingly low price. I think every railroad in the country would have paid \$37 just as cheerfully as they would \$35."

"If this thirty-five dollar rate is generally established, what effect will it have on the mills? Do you think that the mills will all load up, or will they hold off for higher prices?"

"In relation to that, I want to say right here that I do not think they will sell one ton more of rails at even \$30 than they would at \$38. That is my honest conviction."

"That is, you think the low price will not stimulate the demand?"

"It will not. There is just so much business that will be done; putting the price down will not help it one bit. It will create a feeling of distrust among moneyed men, and you will find the lower the price of rails the more difficult it will always be to get men to put their money into new enterprises or build new work. In other words, the cheaper you can build a railroad the more difficult it will be to get the money to build with."

A gentleman connected with a very prominent steel-rail company was then seen, but, while he gave his opinion freely upon the general situation, he desired his name withheld. He said:

"In relation to the possibility of lower figures, it would be difficult for rails to remain at a price below cost, and the cost price is something that is hard to get at. It is necessary to know how costs are made up—what constitute the items of cost. Of course, the principal items are stock and labor. Then there are the expenses and other items, some of which one concern might put in and another leave out; and to make up the cost a person must know all these, and that is rather difficult, as it is a private matter. Whether \$35 will be considered a standard price no one can tell. I do not believe that any of the mills will be inclined to run at a loss. Of course, before doing that they will reduce production. The conductors must be properly proportioned for the current that they have to carry; whatever resistance there is in the conductor will cause a corresponding development of heat, which will vary with the amount of electricity passing, and inversely as the sectional area. The material must be free from impurity, otherwise an impure section will increase the resistance. The extraordinary difference in the connecting power of a sample of 'commercial' Rio Tinto copper wire, as compared with the pure metal, was shown in an experiment by Dr. Matthiessen—the conducting power being only 13.6, as against 99.95 for pure copper. The continued heating of an impure metallic conductor has a certain effect on its electrical resistance. With the sample just mentioned, the conducting power at 100° C. decreased from 13.58 to 13.558 after the wire had been heated for three days. It does not always follow that there will be a decrease in the conducting power, as with alloys the opposite effect is produced. A copper-silver alloy showed an increase of .264, after having been heated to 100° C. for three days, and a tin-copper alloy an increase of .13."

As the temperature in Dr. Matthiessen's experiments was not increased over 100° C., the author has made some further experiments—heating the wires by the electric current from a secondary battery to within a few degrees of their melting point. The following materials were tried, the wires and foil having such sectional areas, and so arranged that, on the current being increased by 20 per cent., they were immediately fused. The total length of each experiment was 24 hours, during which time the current passing through varied slightly, and the following is a mean of the results:

day, George Boulton, John Hoffman and other well-known operators in the oil regions."

SCIENTIFIC AND TECHNICAL.

A New Mineral.

MM. G. Cesaro and G. Despret have given the name "richellette" to a supposed new mineral from Richelle, in the neighborhood of Visé, Belgium. It occurs in compact masses which have a cream-yellow color, becoming ochre yellow on alteration. Its luster is greasy or resinous to earthy, and its hardness varies between 2 and 3, the specific gravity being 2. An analysis gave the following results:

P_2O_5 28.71 Fe_2O_3 1.89 Al_2O_3 5.64 CaO Ignition. 35.54 = 100.39

At 100° the mineral loses 23.33 per cent. water, and at a red heat 6.10 water and 6.11 hydro-fluoric acid. MM. Cesaro and Despret leave the composition of the mineral in doubt, but regard it as a fluo-phosphate of iron and calcium, the fluorine being, in their view, in combination with the iron; the microscopic examination which they propose to make will, perhaps, throw some light upon the subject.

The Fire Risks of Electric Lighting.

In a paper read at the recent meeting of the British Association, Mr. Killingworth Hedges remarked that there is a great difference between the electric currents which have been in constant use for telegraphic purposes and those which are to be supplied by the undertakers under the British Electric Lighting Act. The latter can only be said to be free from danger when the heat generated by the current is utilized in its right place, and not developed in the conductors or wires which lead the electricity to the incandescent lamps. The British Fire Risk Committee have already issued rules for the guidance of users of electric light; these can hardly be said to embrace all the salient points of the new subject, which can only be arrived at after years of practical work.

The conductors must be properly proportioned for the current that they have to carry; whatever resistance there is in the conductor will cause a corresponding development of heat, which will vary with the amount of electricity passing, and inversely as the sectional area. The material must be free from impurity, otherwise an impure section will increase the resistance. The extraordinary difference in the connecting power of a sample of "commercial" Rio Tinto copper wire, as compared with the pure metal, was shown in an experiment by Dr. Matthiessen—the conducting power being only 13.6, as against 99.95 for pure copper. The continued heating of an impure metallic conductor has a certain effect on its electrical resistance. With the sample just mentioned, the conducting power at 100° C. decreased from 13.58 to 13.558 after the wire had been heated for three days. It does not always follow that there will be a decrease in the conducting power, as with alloys the opposite effect is produced. A copper-silver alloy showed an increase of .264, after having been heated to 100° C. for three days, and a tin-copper alloy an increase of .13."

As the temperature in Dr. Matthiessen's experiments was not increased over 100° C., the author has made some further experiments—heating the wires by the electric current from a secondary battery to within a few degrees of their melting point. The following materials were tried, the wires and foil having such sectional areas, and so arranged that, on the current being increased by 20 per cent., they were immediately fused. The total length of each experiment was 24 hours, during which time the current passing through varied slightly, and the following is a mean of the results:

No. 1. Commercial tin wire..... 815 .8 —.009

No. 2. Lead, soft..... 835 .8 —.005

No. 3. Copper, soft..... 81 .8 no change

No. 4. Pure tinfoil..... 86 .8 no change

No. 5. Tin and lead alloy..... 87 .8 —.19

No. 6. Albo alloy, in foil..... 835 .8 —.009

No. 7. Aluminum and tin alloy..... 82 .8 no change

Material. Resistance before heating. Resistance of leads. Difference after 24 hours.

Ohms. Ohms. Ohms.

Radiation of Silver at the Moment of Solidifying.

At the International Electrical Congress, in 1881, J. Viole proposed as an absolute photometric standard the radiation of a square centimeter of melted platinum. Dumas approved of the proposal, and at his invitation Viole performed some preliminary experiments with silver. From the moment when solidification begins, in contact with the containing vessel, until the whole becomes solidified, the radiation of the liquid part remains constant. The constant portion of the radiation is so sharply defined that silver may furnish a secondary fixed standard, which will be especially convenient in all the measurements of spectro-photometry.

Astronomical Observations at High Altitudes.

Astronomical experiments conducted at various heights in Peru and Bolivia during the first half of this year yielded some interesting results. At La Paz (elevation 12,000 feet) Mr. Ralph Copeland, under whose supervision the observations were made, saw stars that are with difficulty seen in Europe with artificial aid with the naked eye, notwithstanding the light of the full moon. At Puno (12,500 feet), Canopus, Sirius and Jupiter were visible to unaided vision from 1 to 25 minutes before sunset. A number of small planetary nebulae and stars, with very remarkable spectra, were found in the southern part of the Milky Way, by searching with a prism attached to a 6-inch telescope on Professor Pickering's plan. The most remarkable stars showed spectra of little more than two bright lines, which Mr. Cope had observed in the spectra of various nebulae. Several close double stars were discovered. At Vincocaya (14,360 feet) the solar spectrum was very much increased in brightness at the violet end. At Arequipa (7500 feet) the relative humidity of the air was as low as 20 per cent., and not much higher at other stations. Mr. Copeland believed that an observatory might be maintained with great facility at a height of between 9000 and 12,000 feet, the night temperature being little below the freezing point at any season. Beyond that height an increased elevation of 150 feet roughly corresponds to a fall of the thermometer of 1° F., and a depression of the barometer of 1/10 inch, so that at 15,000 feet very arduous winter conditions were encountered. Mr. Copeland thought, however, that in the early summer an experimental station might be maintained for a few weeks as high as 18,000 feet. Pieces of apparatus 2 tons in weight could readily be transported to any of the stations up to 14,360 feet.

A New Current Meter.

One of our exchanges gives a short account of a new and interesting appliance, proposed by a Mr. L. d'Auria, for determining the mean velocity of the water at any vertical in a stream. The apparatus consists of a scow or pontoon, to be moved in the desired place; a pole with a pulley near each end, carrying an endless cord; a light ball, and a species of net or grillage. The pole is fastened to the bottom alongside the scow, at the point where the velocity is to be gauged, and the ball is lightly attached to the cord by a string, so as to be disengaged by a moderate pull when it reaches the bottom. The time of the disengaging pull is noted, and also the time of the appearance of the ball at the surface. As the floating grillage has previously been moored over this place, the ball is caught at the point of rising, and the horizontal distance of this point from the pole measured. Hence are known, upon measuring the depth, the two co-ordinates of the point at the surface from the bottom of the pole. Mr. d'Auria proposes to weight the ball until it shall be one-half the heaviness of water, and deduces some equations to prove that the ball rises with a practically uniform velocity. He observes that, for a depth of 30 feet, from which such a ball would rise in about 11 seconds, and a mean velocity of current of 4 feet per second, the ball would travel horizontally about 44 feet.

Veneer Making.

In an article on the subject of veneers, the Northwestern Lumberman gives some interesting facts. Straight grained and moderately soft woods are sliced off a log by a weighted knife with a drawing cut, the log being 10 feet long and the veneers varying from 1/8 inch to 1/16 inch in thickness, the width corresponding, of course, to the diameter of the log. A knife machine which gives a half-rotary movement to a semi-cylindrical turned log, allowing a veneer to be cut following the log's diameter, produces wide veneers from logs of small diameters. But while the knife has opened up new possibilities in veneer manufacture, the saw has by no means been abandoned; such woods as ebony and lignumvite cannot be cut with a knife, while finely figured and consequently close-grained mahogany, and some rosewoods, are difficult to cut. The saw, therefore, has its place. Such saws must be very thin, and so finely adjusted that hardly the slightest variation will occur in the thickness of the veneers turned out. While nicely arranged circular saw will turn out boards varying the twentieth part of an inch, which would be imperceptible, such a lack of uniformity in thin sheets would prove a damaging imperfection. Before being cut the veneer material must be carefully steamed, the same as in bending. A tight box 12 feet long and 4 feet deep and wide is used, and exhaust steam is utilized. An ordinary wood like black walnut, which has an open grain, will steam sufficiently in six hours, but the close-grained South American woods require 36 hours. Mahogany will steam sufficiently in 24 hours. Mahogany, tulip, and rosewood, being hard to cut, require more and careful steaming and a knife in the best condition. The veneers wrinkle when laid together, but straighten out readily when glued properly to a body. Veneers will dry in the air in about 12 hours, but are not kiln-dried, although the latter method is used for lumber out of which veneers are to be made.

Mr. John Roach has been interviewed, and the following is extracted from the printed report thereof: "How is it, Mr. Roach, that you were able to bid so much lower than any one else for the contract for building the

cruisers?" "Simply because I make every thing pertaining to a ship. I take the ore and turn out a ship. I thus get a profit on every part, and, though much may not be made on one part, in the aggregate of profits I get a fair return. Steel-making is a new industry in this country, and I am the only shipbuilder who has a steel plant in his own yard. Mr. Cramp complained, when the bids were opened, that the steel-makers from whom he got bids asked him 3 cents a pound more for steel than my estimate. As there are to be 13,000,000 pounds of steel in the four ships, this would make a difference of \$390,000 in the cost of the material alone. I, however, by making the steel myself, am able to bid that much less, and yet to make a profit." Query.—Why don't Mr. Roach sell his steel for 3 cents per pound more than he can get for it from the Government, instead of building cruisers with it?

The Lick Telescope.

Mr. John Michels says: "It appears that the project of building great telescopes is easier in the conception than in the final execution. Twelve months ago I visited Mr. Alvan Clark's optical works at Cambridgeport, Mass., and saw the great Streuve objective glass placed for the first time within its

colossal tube and pointed toward a celestial object, and, after the Clarks, I was the first to test its powers. It was still uncorrected, but worked to a marvel, considering that the most delicate and artistic touches had still to be added. Yet it must be confessed that an astronomical telescope directed at a fixed star is one of the most disappointing things to look through, and, even with the biggest telescope objective which ever left the hands of the optician, there was no exception to this rule. With all its powers, this wonder and masterpiece of the Clarks was unable to resolve the disk of the far-off star, and in this respect it was on a level with a little dollar instrument—a mere plaything in the hands of a child. Its wonderful light-gathering properties, however, were startling, and the feeble rays of the star were increased to a blaze of light. It has since been delivered to Professor Streuve, and in his hands and under his able management fine work may be expected from this noble instrument."

"On a table in the workshop was placed the great telescope objective, 3 feet in diameter, made for the Lick Observatory in California, which in size would dwarf the king of telescopes, ready to start for Russia. It may not be known to all that achromatic object glasses are made of two distinct lenses, one made of flint glass and the other of crown glass, the two combined making the perfect lens. In this instance the flint-glass lens only was present, its companion being daily expected from France. A few days ago I wrote to Mr. Clark asking what progress he had made with the Lick objective, hoping, as the preparations in California were so advanced, that the lens was nearly finished. The public will probably be surprised to hear that the first chip off the glass has still to be made,

**NEW AND IMPROVED
BUFFALO CUPOLA & FORGE BLOWERS**



All Sizes
and Styles,
for Every
Possible Duty

The Most
Positive,
Durable and
Economical
Made, and
**GUARANTEED TO GIVE
PERFECT SATISFACTION**

BUFFALO FORGE COMPANY,
BUFFALO, N. Y.

**AMERICAN FACING CO.
AND
WHITEHEAD BROTHERS'
FOUNDRY FACINGS**
And Supplies of all Kinds.

BITUMINOUS OR SEA COAL, LEHIGH, CHARCOAL, SOAPSTONE, INDIA
SILVER AND GERMAN LEADS, &c.

XX MINERAL FOR HEAVY WORK.

X MINERAL FOR MEDIUM AND LIGHT WORK.

Our fine Facing known, as WHITEHEAD'S STOVE PLATE FACING, is the best in use. Send us a sample order.

ALSO DEALERS IN

MOLDING SAND,
Fire Sand, Fire Clay and Kaolin.

We give special attention to the selection of Albany and Crescent Sands for Stove Plate and Ornamental Iron and Brass Castings.

WM. WHITEHEAD, Treas.,
515 and 517 West 15th St., New York City.

PENFIELD BLOCK COMPANY,
LOCKPORT, N. Y.
ANCHOR BRAND
PULLEY BLOCKS & TRUCKS.
BRONZE MEDALS
AT CHICAGO EXPOSITION.
AGENCIES WITH
HENRY B. NEWHALL CO.,
105 Chambers Street, New York, and 47 Pearl Street, Boston.
S. H. & E. Y. MOORE,
163 & 165 Lake St., Chicago.
L. M. RUMSEY MFG. CO., St. Louis.

Keystone Portable Forges.
Best in the Market. Strong Blast and Easily Worked.
Durable, and give entire satisfaction. All sizes for every kind of work. Also
Pressure Blowers
AND
Exhausters.
Send for Catalogue.
MANNING, MAXWELL & MOORE,
New York Agents, 111 Liberty St.
Keystone Portable
Forge Co.,
204 North Fourth Street,
PHILADELPHIA, PA.

COVERINGS.

The Best Boiler and Pipe Covering Made!

THE CELEBRATED
PATENT AIR SPACE
COVERING for Steam
Boilers and Pipes, HOT
BLAST PIPING, &c., &c.

TOOPE'S PATENT ASBESTOS-LINED REMOVABLE COV- ERING, made of Felt and As- bestos Fibres, on STEAM BOILERS and PIPES, Refrigerators, Meat Cars, Ice Houses and Hot and old Water Pipes. Easily applied by any one.

NATIONAL STEEL TUBE CLEANER for cleaning Boiler Tubes. Saves its cost every time it is used, and is endorsed by the best engineers.

ASBESTOS MATERIALS, FIBRE, MILLBOARD PACKING AND CEMENT.
Address CHALMERS SPENCE CO.,
131 FIRST AVENUE, 419 & 421 8th St., N. Y.
Pittsburgh, Pa.

BOLT & RIVET CLIPPERS.

For cutting off the ends of Bolts and Rivets, on carriages, wagons, harness, etc. Ask for them where you buy your hardware, or send for catalog and price list.

CHAMBERS, BROTHER & CO.,
52d St., below Lancaster Ave.,
Philadelphia, Pa.

**THE LIVINGSTON HORSE
NAIL COMPANY,**

104 Reade St., NEW YORK,

MANUFACTURERS OF THE

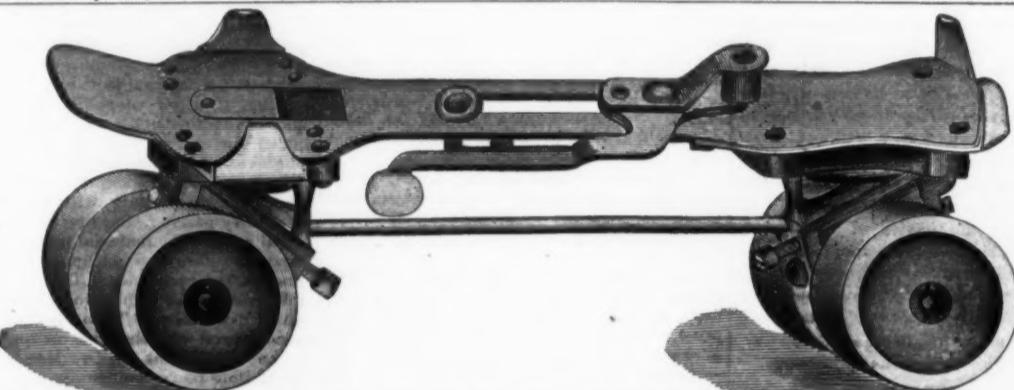
"EMPIRE BRONZED"

Hot Hammered and Pointed

HORSE NAILS.

WILL NOT SPLIT,

And will Hold a Shoe Better than any Nail Made.



We now offer our New Patent Self-Adjusting Lever Rink Roller Skate, with foot plate and working mechanism made of crucible steel, blued or nickelized. Malleable Iron Trucks, Adjustable Rubber Springs, Steel Axles and Boxwood Wheels. This is the best Guideable Rink Skate ever offered to the public. We also manufacture the Standard Scientific and New Rink Roller Skates, with wood tops, also New York Roller Skates. Our Illustrated Catalogue for 1883, showing the most complete line of Roller and Ice Skates ever offered to the trade by any manufacturer, will be mailed on application.

UNION HARDWARE COMPANY,

75 Chambers Street, NEW YORK.

Manufactory, TORRINGTON, CONN.

MORRILL'S PERFECT SAW SETS AND BENCH STOP.

FOR SETTING EVERY VARIETY OF SAWS.

For price lists
and discounts
Address
ASA FARR,
64 College Place,
NEW YORK.

JEFFERSON NAILS

ALSO
JEFFERSON PIG IRON.
Forge and Foundry, JEFFERSON IRON WORKS.
Office and Works, STEUBENVILLE, OHIO.

W. H. WALLACE, President. C. B. DOTY, Vice-President. GEO. P. HARDEN, Secretary.

**THE ORIGINAL AND ONLY GENUINE
CHAMPION SAW.**



We Caution the Trade against buying imitations of this Saw stamped or etched the "CHAMPION," as all such are infringements of our Trade-Mark.

WHEELER, MADDEN & CLEMSON MFG. CO., Middletown, N. Y.

CROWN WATER METER.

ADOPTED BY THE

DEPARTMENT OF PUBLIC WORKS,

NEW YORK CITY.

National Meter Co.,

JOHN C. KELLEY, President,

No. 51 Chambers St., NEW YORK.

REVOLVERS.

Sold by Gun and Hardware Trade Everywhere.
OTIS A. SMITH, Manufacturer, Rockfall, Ct.

ИЛЮСТРИРОВАННЫЕ КАТАЛОГИ
EXECUTED
IN FIRST CLASS STYLE AND WITH DESPATCH
O.W. MADDAUS
DESIGNER AND ENGINEER ON WOOD
PARK ROW NEW YORK

November 8, 1883.

THE IRON AGE.

17

GALLOWAY BOILER

IMPROVED UNDER PATENTS OF 1875 AND 1876.

Safety Economy in Fuel, Low Cost of Maintenance Dry Steam without Superheating, Large Reserve Power
ARE THE ADVANTAGES OFFERED BY THIS BOILER IN A PRE-EMINENT DEGREE.

3000 Horse-Power in Progress and for Immediate Delivery. Correspondence Solicited.

EDGE MOOR IRON COMPANY

SOLE LICENSEE AND MANUFACTURER FOR THE UNITED STATES,

POST OFFICE, WILMINGTON, DELAWARE.

Philadelphia Office, 1600 HAMILTON STREET

New York Office, 79 LIBERTY STREET.

WM. SELLERS, Pres. JNO. SELLERS, Jr., Vice-Pres. ELI GARRETT, Sec. and Treas. GEO. H. SELLERS, Gen. Supt.



MOUNT CARMEL OX SHOES WITH STEEL TOE CALKS,

FINISHED COMPLETE. READY FOR NAILING ON.

The Best and Cheapest Shoe Made.

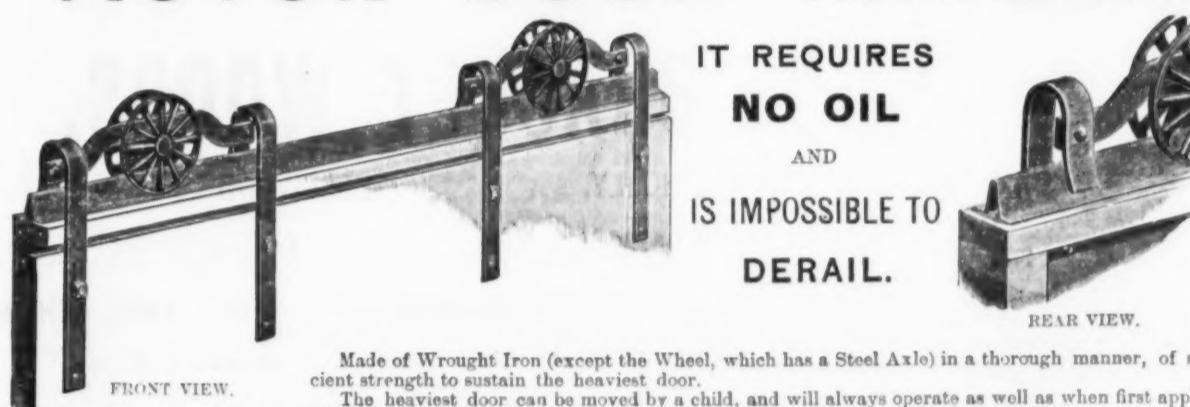
WOODRUFF, MILLER & CO.,

MOUNT CARMEL, CONN.



Send for Price List.

VICTOR DOOR HANGER.



IT REQUIRES
NO OIL
AND
IS IMPOSSIBLE TO
DERAIL.

Made of Wrought Iron (except the Wheel, which has a Steel Axle) in a thorough manner, of sufficient strength to sustain the heaviest door.
The heaviest door can be moved by a child, and will always operate as well as when first applied.
The Rail is made of Wrought Iron, in two-feet sections.

Trade Supplied by

VICTOR HANGER CO.,

NEWBURYPORT,
IMASS.

R. D. WOOD & CO.,
Philadelphia,
Manufacturers of
Cast Iron Pipe
FOR WATER AND GAS,
Lamp Posts, Valves, &c.,
Mathew's Pat. Anti-Freezing Hydrants.
400 CHESTNUT STREET.

AGENTS IN ALL FOREIGN COUNTRIES.



119 South Fourth Street,
PHILADELPHIA
Branch Office, 605 Seventh St. Washington, D.C.
H. HOWSON, Engineer and Solicitor on Patents.
G. HOWSON, Attorney at Law and Counsel in Patent Cases.
SEND FOR CIRCULARS.

J. POPPING'S

Patent Machine and Tool Works,

Manufacturer of



PATENT WILLOW AND RATTAN SPLITTING
AND PLANING MACHINES, SOLID IRON
SHOULDER RABBET AND ENGLISH
BULL NOSE PLANES, ETC.

N. E. Cor. 58th St. and 11th Ave., New York.



THE BEST GLUE IN
THE WORLD FOR
Pattern Making,
EMERY BELTS,
WHEELS, &c., &c.
Send for Pamphlet.

LE PAGES LIQUID GLUE
IN BOTTLES AND IN CANS READY FOR USE
STRONGER MORE CONVENIENT AND
MORE ECONOMICAL THAN ANY OTHER GLUE
SOLD EVERYWHERE ON ITS MERITS M'D BY
RUSSIA CEMENT CO. GLOUCESTER, MASS.

AWARDED THE
GOLD MEDAL
AT THE
INTERNATIONAL
EXHIBITION,
LONDON, 1883.

INDUSTRIAL ITEMS.

MASSACHUSETTS.

Woods, Sherwood & Co., Lowell, have recently added another department, the manufacture of tempered steel wire for card-clothing purposes, and are said to be making large sales.

The Chapman Valve Works, at Indian Orchard, are full of business. New buildings have been added to the original plant, first erected in 1875. The structures now cover a large tract of ground nearly in the form of a quadrangle, and, being all brick, present almost the appearance of a walled town. Running directly through this mass of buildings is a spur track of the Boston and Albany Railroad connecting with both the main line and the Athol branch. The iron used is of the best quality, and comes directly from the smelting furnaces. In all departments of the work about 120 men are employed to turn out 4500 valves and hydrants a month.

The Pevey Brothers, Lowell, iron founders, still continue to increase their business, now making quite a specialty in house work, columns and mill repairs. They have two large molding rooms, &c., furnished with monitor skylights, the novel window fastenings attracting considerable attention, being operated from outside.

The Norway Steel and Iron Works, South Boston, are turning out steel plates for the Government cruisers. Some samples taken at random gave 66,000 pounds tensile stress per square inch, with 31 per cent. elongation, as tested by a U. S. N. Government inspector of material.

At Chicopee, the Belcher & Taylor Agricultural Tool Company are occupying the new addition to their main building, and their facilities are greatly increased.

CONNECTICUT.

The Yale & Towne Mfg. Company are building a steam crane for the Baldwin Locomotive Works, which will be driven by a Westinghouse reversing engine.

NEW JERSEY.

Articles of incorporation have been filed in the Clerk's Office of the County of Camden by the Camden Iron Works, with a capital stock of \$400,000, \$300,000 of which being set down as subscribed. The works of Jesse W. Starr, Sr., have been purchased, an order having been granted in the United States District Court at Trenton permitting Starr to dispose of his property, and vacating the order placing the iron works and other assets in the hands of his creditors. All claims against the works have been arranged and they will go into operation, it is thought, in a few weeks, as large orders have been received. The chief production will be foundry iron and machinery. Branch offices will be opened in Philadelphia and New York. The copartnership is limited, to expire, by the articles of incorporation, on the 30th of September, A. D. 1930. A majority of the stock is held by the Wood Bros., proprietors of the large iron works on Ridge Road, Philadelphia.

PENNSYLVANIA.

The ground is staked off for the erection of the mill of the new Chartiers Iron and Steel Company, Limited, at Mansfield, and building will soon be commenced.

The large foundry of the Shenango Machine Company was destroyed by fire at 7 o'clock on the evening of October 30. The works were fired by the explosion of a heavy run of molten metal while a cast was being made. A very high wind was raging at the time, and before the fire department could reach it the building was a mass of flames. The loss will be from \$6000 to \$10,000—partly insured. Only a few weeks ago this company's machine shop was burned, inflicting a very severe loss, which renders the present loss a very serious one.

The sale of the Huntingdon Car Works commenced last week, the tools, material, &c., being disposed of first. No arrangements have apparently been made by any combination or syndicate to run the works, as the articles sold have been bought by everybody who desired, and will be scattered widely.

The Ball Electric Manufacturing Company, of Reading, have applied for a charter. The company will manufacture the electric inventions of Messrs. Charles E. and R. E. Ball of New York, and H. W. Spang, of Reading, which consist of dynamo-electric machines, arc and incandescent electric lights and electric motors.

It is stated that the Pennsylvania Railroad Company have about completed arrangements to lease their anthracite mines to a syndicate headed by Hon. William L. Scott, of Erie. The entire production of these mines, which are located at Shamokin, will be 3,000,000 tons this year, and it is understood that Mr. Scott, after obtaining these mines, will greatly augment the shipments of anthracite coal westward by lake, and that the syndicate will pay \$1 per ton on all coal mined, the tonnage being assured to the railroad company.

The work of repairing Leesport Furnace is nearly completed, and it will be blown in shortly.

The Pottstown Iron Company have partially shut down their boiler-plate mill for want of orders.

The works of the Keystone Hardware Manufacturing Company, in Reading, are announced for sale.

The chain works at West Middlesex, owned by the Wheeler Iron Company, caught fire on Nov. 2, at 5 o'clock, and were burned to the ground. The forges and chimneys are standing, and a new building will be erected at once. About 60 hands are thrown out of employment. The loss is partially covered by insurance. The offices and rolling mill were saved by tearing away one end of the building that was burned.

Latham & Matthews, hardware agents, at No. 15 North Sixth street, Philadelphia, have made an assignment to Samuel B. Huey. The firm's liabilities are to \$25,000, and the assets are at present unknown.

PITTSBURGH AND VICINITY.

Tibby Bros. have started to bore a gas well on their property at Sharpsburg, whose product they will use at their glass works. They are running two furnaces at present, and are making good.

The Pittsburgh Tool Company, organized but one year ago, have gathered together a very choice outfit of tools and machinery for manufacturing their special class of works. They make in their forging department iron and steel tuyeres and scraper heads, and in their tool department taps, drills, &c.

The Edgar Thomson Steel Works are about to attempt to operate their works with natural gas.

During the six weeks from September 8 to October 13, No. 1 Furnace of the Isabella Furnace Company made 8680 $\frac{2}{3}$ tons of iron of 2268 pounds, an average of 1446 tons. The furnace has now been in blast two years and eight months, and has made over 151,000 tons of iron on the present lining.

OHIO.

The Cummer Engine Company now have a capacity of about four engines per week, and expect by spring to be able to turn out five or six engines per week.

The steel-rail department of the Cleveland Rolling Mill Company is now turning out about 250 tons of rails per day.

The American Nail Machine Company, Ashtabula, have just shipped a consignment of their machines to Antwerp, Belgium, and the demand for them is such that the company will have to increase their facilities and force.

The new Kelly nail mill, at Ironton, made its first heat last week. One of the boiling furnaces was fired up and two heats were made and rolled, to see how the rolls would work. The results were very satisfactory. The forge will be in full operation and some of the machines running by the latter part of this week.

The new steel plant of the Bellaire Nail Works is rapidly advancing toward completion.

ILLINOIS.

The Chicago Forge and Bolt Company are erecting a new 40 x 100 feet warehouse and stockhouse.

The Malleable Iron and Machine Company, of Aurora, are doing an active business in their gray iron department, but are doing but little in malleables.

The Perfection Window Cleaner Company, of Chicago, have removed their office and factory to No. 27 Washington street, in order to better accommodate their rapidly increasing trade. Their present location is much more convenient to the hardware district and better adapted to their business.

Conrad Colteeneidt, of Chicago, manufacturer of copper kettles, boilers and stills, has made a voluntary assignment. Liabilities, \$30,000; assets estimated at \$18,000. The creditors are chiefly in Chicago and Pittsburgh.

KENTUCKY.

The tall smoke-stack at the blast furnace of the Norton Iron Works, at Ashland, recently fell to the ground during a wind storm. The stack was entirely of brick, and 157 $\frac{1}{2}$ feet high. In its falling, however, but little damage was done, as it did not fall at length, but, rather, seemed to cave in and fall in a mass. The accident will seriously interfere with the operation of the works.

MICHIGAN.

It is stated that the Emmett Mining Company have definitely determined to build a blast furnace at Iron River.

MISSOURI.

The Helmbacher Forge and Rolling Mill Company, of St. Louis, are now in full operation, and are turning out some fine work in the way of steamboat shafts and other heavy work.

The recent purchaser of the Standard Tool Works in St. Louis does not intend to start them up until next spring at the earliest, on account of the poor condition of business.

The St. Louis Ore and Steel Company made the largest monthly output at their works in the month just closed ever made in their history.

A Well-Tried Steel Steamship.—New Zealand papers to hand contain accounts of the grounding of the steamship Rotomahana, belonging to the Union Steamship Company of New Zealand, on Waipa Point—the same dangerous reef on which the ill-fated Tararus and many lives were lost on the 25th of April, 1881, and where it had been the subsequent intention of the New Zealand Government to raise a lighthouse. The mishap to the Rotomahana occurred on the morning of Saturday, the 4th of August. At the time of the accident she was going at the rate of nine knots an hour, but the discovery that she was in the vicinity of breakers enabled the officers in charge to telegraph orders to the engine-room, which had the effect of considerably reducing the speed before she struck. She lay bumping on the reef for some time, but was ultimately got clear, and returned to Port Chalmers in safety. Subsequent docking showed that the vessel had sustained serious damage to her propeller and stern-frame, large portions of these having been completely broken off. In addition to these, the bottom of the vessel for considerable length aft had been dented and misshapen, and rivets started, but no actual piercing had taken place, doubtless owing to the material of which she is built being mild steel of great ductility. It is estimated that £4000 or £4500 will have to be expended in putting the vessel to rights. This is the third occasion on which the Rotomahana has accidentally grounded, sustaining damage, and yet come well through the ordeal. She was built in 1879 by Messrs. Denny, of Dumbarton, and was the first ocean-going steamship built of mild steel.

WHOLESALE METAL PRICES, November 7, 1883.

(For Wholesale Hardware Prices See Pages 27, 28.)

METALS.

IRON.—DUTY: Bars, 8-10¢ to 11-10¢ per lb.; provided that no Bar Iron shall pay a less rate of duty than 35¢. Sheet, 1-10¢ to 11-10¢ per lb.; Round, Hoop and Scroll, 1¢ to 1-10¢ per lb.; Rail and Bars weighing more than 25 lb. per yard, 1-10¢ per lb.

American Iron.

Foundry No. 1. \$20.50 @ 21.00
Foundry No. 2. 19.00 @ 20.00
Gray Forge. 18.00 @ 19.00

Scotch Iron.

Garnbroe. 22.00
Celtness. 23.25
S. & S. 23.00
Glencairn. 22.00
Gartsherrie. 23.00
Langloan. 23.25
Suimerlee. 22.50 @ 23.00
Dalmellington. 20.75 @ 21.00
Eglinton. 20.50 @ 21.00

Hails.

Steel, at Eastern mills. 35.00 @ 36.00
Old Rail. Ts. 22.00 @ 23.00

Scrap.

Wrought, 1/2 ton, from ship and yard. 23.00 @ 24.00
Bar Iron from Store.

Common Iron:
1/2 to 1 in. round and square. 1/2 lb. 2 @ 2.10¢
1 to 6 in. x 3/4 to 1 in.

Refined Iron:
1/2 to 1 in. round and square. 1/2 lb. 2.30¢
1 to 6 in. x 3/4 to 1 in.

Rods—5¢ and 11-15 round and sq. 1/2 lb. 2.40¢
Bands—1 to 6x3-16 to No. 12. 1/2 lb. 2.60 @ 2.70¢
Norway Nail Rods. 5 @ 3/4¢

Sheet Iron.

Common R. G.
American American.

Nos. 10 to 16. 3.15 @ 3.30¢
17 to 20. 3.30 @ 3.50¢
21 to 24. 3.63 @ 3.75¢
25 and 29. 4.00 @ 4.25¢
27. 4.12 @ 4.35¢
28. 4.25 @ 4.50¢
B. B. 2d qual.

Galvanized, 10 to 20. 63¢
Galvanized, 21 to 24. 74¢
Galvanized, 25 to 28. 8¢
Galvanized, 29. 9¢
American Russia. 10 @ 13¢ @ 14¢
Russia. 10 @ 13¢ @ 14¢
American Cold Rolled B. B. 7¢
Iron Wire. See Wire.

STEEL.—DUTY: Ingots, Bars, Sheets, &c., valued at 40¢ per lb.; Bars, 2d qual., valued above 4¢ and not above 10¢ per lb.; 2d qual., valued above 10¢ per lb., 3½¢ per lb.; Extras.—Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 1½¢ per lb. in addition to above; Steel Circular Saw Plates, 1½¢ per lb. in addition to the above.

American Cast Steel.

For American Steel, see Pittsburgh quotations.

English Steel.

Best Cast. 15¢
Extra Cast. 16¢
Circular Saw Plates. 16¢
Round Machinery, Cast. 16¢
Forged, Cast. 16¢
Best Double Shear. 15¢
Blister, 1st quality. 16¢
German Steel, Best. 16¢
2d quality. 16¢
3d quality. 16¢
Sheet Cast Steel, 1st quality. 16¢
2d quality. 16¢
3d quality. 16¢

TIN.—DUTY: Plates, Sheets, Tagger and Terne, 1½¢ per lb.; Bars, Block and Pigs free.

Banca. 23 @ 24¢
Straits. 22 @ 23¢
English. 23 @ 24¢
Bar. 24 @ 24¢

Charcoal Tin Plates.

I.C. 10x14. 225 sheets. 20¢ per box. 6.75
I.C. 20x28. 112 " 12.50 @ 13.50

I.C. 10x14. 225 " 7.50 @ 8.00
I.C. 14x20. 112 " 7.50 @ 8.00

D.C. 18x20. 100 " 6.00
D.X. 12½x17. 100 " 7.50

For each additional X add... 6.00 @ 1.75

Coke Tin Plates.

Best. Ordinary.
I.C. 10x14. 85.75 \$5.25 @ \$5.50

I.C. 12x12. 6.00 @ 5.75

I.C. 10x20. gutters, 225 sheets. 8.50

I.C. 20x28. 112 sheets. 11.50

Tin Plates.

Prime Char. 3d quality Coke.
I.C. 14x20. M. F. @ 37.75

I.C. 14x20. 8.50 @ 8.62¢ @ 8.37¢ \$5.35 @ \$5.37¢

I.C. 11x20. 7.50 @ 8.00

I.C. 20x28. 11.50 @ 11.25 10.75 10.00 @ 10.50

I.C. 20x30. 13.50 @ 14.00

Tin Plates.

I.C. 14x20. 2 sheets for No. 7, 112 sheets. 31.50

I.C. 14x20. 2 " 14.50 @ 14.50

I.C. 14x31. 2 " 14.50 @ 15.00

Ingots, Lake. 15¢ @ 16¢

Ingots, Baltimore. 14½¢ @ 15¢

Braziers' Copper, ordinary sizes, under 16 oz. and over 12 oz. 1/2 per sq. ft.

Braziers' Copper, 10 oz. and 12 oz. 1/2 per sq. ft.

Copper Bottoms, 11x18. 15¢ per sq. ft.

Tinned Sheathing, Plastered, 11x18. 11.15 oz. 15.00 @ 15.50

Nickel-Plated Sheathing. 15 oz. per sq. ft.

Plating extra. 25¢ @ 40¢

Flat Copper Boiler Bottoms or Pit Bottoms, cut to special sizes. 25¢ @ 30¢

Tinning.

14x48, by the case. 20¢ sheet, 8¢

14x50, less than case. 20¢ sheet, 8¢

For tinning both sides, double the above amount.

O'Neill's Patent Planished Copper. Net. 14x48

12 and 16 oz. and heavier 35¢ By the case. 20¢ sheet, 8¢

12 oz. and lighter. 38¢ " 37¢

Boiler Sheets. 7 in., 14x36. 9 in., 14x60.

14 and 16 oz. and heavier 37¢ By the case. 20¢ sheet, 8¢

(And all sizes not over 30 in. wide.)

14 and 16 oz. and heavier. 20¢ sheet, 8¢

Copper Wire.

—See Wire.

Sheathing Metal.

Yellow Sheathing Metal. 20¢ per lb. 20¢ per lb.

BRASS AND GERMAN SILVER.

Brown & Sharpe's Gauge the Standard for Metal;

Old English Gauge the Standard for Wire.

BRASS MANUFACTURERS' PRICE LIST.—Dis. 35¢

For less quantity than 100 lb., add 3¢ per lb.

High Brass.

All Nos. not thinner than No. 25, wider than 2 in. Not less than 14 in. 30¢

All Nos. to No. 25, inclusive, and widths over 14 to 20 in. 35¢

All Nos. to No. 25, inclusive, and withs over 20 to 30 in. 35¢

Not $\frac{1}{2}$ ¢ advance on each No. above Nos. 28 to 38.

Inclusive.

All Brass thinner than No. 38 is Platers Brass at 33¢

Sheets 24x48 in., and all sheets cut to particular sizes and lengths under 30 in., in width wider than 2 in. 37¢

Printers' Rules.

Sheets wider than 30 in., and under 40 in. 47¢

" " 40 in. and over. 50¢

Circular sheets, in diam. from 4 in. to 14 inclusive. 40¢

" " over 14 " 20 " 49¢

" " 20 " 40 " 55¢

" " 40 in. 59¢

Low Brass.

Four cents per lb. more than High Brass.

Gilding Metal 8¢ per lb. more than High Brass.

(In Bars. 48¢

Platers' or Gold Metal—Sawed. 51¢

Planed or Polished. 51¢

FOR SLITTING.

Metal, in width 2 in. to 36 in. to No. 28, inclusive, 1¢ per lb. advance.

Metal, in width 2 in. to 1 in. thinner than No. 28, 2¢ per lb. advance.

Metal, in width 1 in. to 1/4 in. thinner than No. 28, 3¢ per lb. advance.

Metal, in width 1/4 in. to 1/4 in., inclusive, not thinner than No. 28, 4¢ per lb. advance.

Metal, in width 1/4 in. to 1/4 in., thinner than No. 28, 5¢ per lb. advance.

Metal, in width less than 1/4 in. to 1/4 in. to particular lengths, add 7¢ per lb.

Tubing.

—Dis. 30¢.

Plain to No. 20, inclusive, above 1/4 in. to 3 in. 30¢

" " above 3 in. 33¢

Nos. 21, 22, 23, 24¢ advance on List for each Number.

Nos. 24, 25, 26, 4¢ advance on List for each Number.

Above No. 26, special rates.

Plain 1/4 in. 30¢

" " 16 in. 11.00

All Mandrel Drawn Tubes, 5 cents advance on List Prices.

Fancy Tubing to No. 20.

English Watch and Extra Patterns Fancy Tubing to No. 20.

Bowing Sawed or Cut 2 to 4 feet long, 2¢ advance on List for each Add 2¢ for each additional cutting under 2 feet.

All Mandrel Drawn Tubes under 1/4 in., 2¢ per lb. advance.

Miscellaneous.

—Dis. 30¢.

Brass Pail Ears. 50¢

Brass Door Rail. 43¢

Scrap.

—Net.

High Brass. 10¢ per lb.

Low. 11¢ per lb.

Turnings, Filings and Chips half the price of Scrap.

Terms—Net cash. Interest to be added after thirty days.

Brass Wire.

—See Wire.

German Silver Tubing.

—Dis. 30¢.

Market Metal. Wire.

THE IRON AGE.

American Society of Mechanical Engineers.

NEW YORK MEETING.

Wednesday.

The American Society of Mechanical Engineers met on Wednesday evening in the rooms of the American Society of Civil Engineers, No. 127 East Twenty-third street, New York. The attendance was large and represented the best elements of the membership, including many gentlemen of eminent standing in the profession. The call to order was not very promptly given, as the members were so busily occupied in hand-shaking and introductions that no one seemed to be in haste to get to business. About half-past eight Dr. E. D. Leavitt, president, tapped for attention. The programme called for some opening remarks by Prof. Henry Morton, but that gentleman was unfortunately absent, and Dr. Leavitt excused himself from the task of taking his place and delivering an opening address. After some routine business, Mr. T. R. Pickering was called on to read the first paper of the session, entitled "American Machinery at Foreign Exhibitions." Mr. Pickering said that he was scarcely prepared to present a finished paper, having yielded to the secretary's persuasion so recently that he could only offer some discursive notes which he would subsequently amplify. It was soon evident to the audience, however, that nothing in the shape of an apologetic introduction was necessary, for Mr. Pickering's notes were extremely interesting, and were found to be full of good points. He described the experience of American exhibitors at Paris and Vienna, the difficulty they had in securing any recognition or cooperation from United States representatives and commissioners, and the gratifying success which had attended American competition for medals and honors. In his notes on the Vienna Exhibition he quoted, on the one hand, from the report of the Massachusetts Commissioner, to the effect that the American department "would not do credit to a Worcester County fair"; and, on the other, from the report of Professors Reuleux, of Berlin, recognizing the remarkable ingenuity and skill which characterized the productions of this country, an opinion which was sustained by the awards made by the Group Jury. We hope soon to have Mr. Pickering's paper in shape for publication, and can promise our readers a pleasant and profitable entertainment in its perusal.

The paper gave rise to a somewhat discursive discussion, in which Mr. C. E. Emery, Dr. Grimshaw and others took part. Mr. A. C. Hobbs was also induced to give some reminiscences of his experiences abroad, and, although not relevant to the subject of the paper, were so entertaining that he was kept talking long after he had finished what he had intended to say at the outset. The stories he told of his world-famous exploits in picking and opening the best English and Continental locks were so entertaining in themselves, and were so well told, that the company would willingly have listened for hours, and twice he was urged to resume after he had taken his seat. To call out an engineer on two *encores* is something unusual, but Mr. Hobbs furnished an unusual entertainment.

At 10 o'clock supper was announced. This was served in the basement, and at its conclusion the party returned to the parlors to finish the evening in conversation.

Thursday.

The morning session was commenced about 9:30, Mr. E. D. Leavitt, Jr., presiding, and after briefly disposing of some preliminary matters of no special importance the secretary, Prof. F. R. Hutton, submitted the treasurer's report, directing attention at the same time to some points relating to the payment of annual dues. Concerning the Committee on Tests, which was next considered, Prof. T. Eggleston referred to the importance of reprinting that portion of the Transactions of the American Society of Mechanical Engineers containing the discussion on the subject of Government appropriation for testing materials, in sufficient numbers to place a copy in the hands of every Member of Congress. This subject, as our readers will probably remember, has repeatedly received attention in our columns, thus rendering very extended particulars unnecessary now. The bill, as Professor Eggleston remarked, did not fail to pass on account of its lack of merit, but mainly because it had not received sufficient support at the proper time. The expense of furnishing the necessary copies referred to was estimated at about \$200, which, considering the importance of the subject and the benefits attending a successful passage of the bill, was comparatively trifling. The Society of Civil Engineers, as will be remembered, made considerable efforts some time since to bring about a satisfactory solution of the question, and President Leavitt consequently suggested that some particulars from Mr. Bogart, secretary of that society, might therefore prove interesting and valuable. Mr. Bogart, responding to the invitation thus extended, remarked that a committee of the American Society of Civil Engineers who called upon the Chief of Ordnance some time ago, found the latter strongly in favor of co-operating with the different engineering societies in order to secure the best results from the Government testing machine at the Watertown Arsenal. He also referred to the late period at which the bill was introduced, ascribing it to, as did Professor Eggleston, the unsuccessful result of the undertaking. The committee of the Civil Engineers' Society was to co-operate with the Chief of Ordnance, but no further action was taken to insure the passage of the bill. At present the committee did not feel authorized to take any decisive steps in the matter. Professor Eggleston, again referring to the subject, remarked that present indications did not point to harmony between engineers and the Ordnance Department, and urged the necessity of taking immediate action, without awaiting further developments at the forthcoming meeting of the Society of Civil Engineers, to be held in January next. Delay up to that time would, it was thought, yield a result similar to that

obtained last year. After a good deal of discussion, and in view of the vital importance of the subject, it was concluded to appropriate the funds (not to exceed \$200) necessary to reprint the paper above mentioned. Taken altogether, however, there was a perceptible lack of enthusiasm in connection with the whole matter, so much so, in fact, as to provoke some comment from Professor Eggleston.

For some reason which, it would appear, was not clearly stated, the report of the Committee on Gauges and Standards, though called for, was not submitted, and attention was therefore next given to the report on the HOLLEY MEMORIAL FUND

by Mr. J. C. Bayles. It was stated that practically the whole amount required for the Holley memorial bronze had been secured, and that, though a small additional amount would be necessary, no difficulty would be experienced in readily obtaining it. At the same time Mr. Bayles pointed out that the Central Park Commissioners could not authorize the erection of the bronze before the expiration of five years from the time of Mr. Holley's death, this length of time being required by law.

As to the visit of the British Iron and Steel Institute to this country in 1884, Mr. Bayles remarked that during the past summer two gentlemen well known in this country were in Great Britain and had conferences with members of the Iron and Steel Institute, and Mr. Carnegie had an official conference with the council. In these several interviews the general sense was expressed by the Institute to visit this country in 1884, and it now seems probable that representative delegates will come to this country if assurance be given that the engineers and ironmasters here will take suitable measures to secure a pleasant gathering. Mr. Bayles was aware that the discourteous reception of the previous invitation extended by the American Institute of Mining Engineers, and the American Society of Civil Engineers, and presented personally by the late A. L. Holley, had created a decided feeling, and that it would probably be impossible to secure for the British Institute another invitation to hold a meeting in this country. The matter, however, would be brought about, if at all, in a way to relieve the different engineering societies from extending a formal invitation. Those members who intended to come to this country would avail themselves of the meeting of the British Association in Montreal, Canada, and would then be in a position to readily come to this country if an invitation were extended. Under these circumstances, it would be necessary for the American Society of Mechanical Engineers to recognize their presence, and as a preliminary to any formal action Mr. Bayles stated that he would offer the following resolution:

Resolved, That the council be requested to appoint a committee of three members to cooperate with committees representing the Institute of Mining Engineers, and the Society of Civil Engineers, with instructions to consider and report what action should be taken by this society in the event of an expression by the British Iron and Steel Institute of a desire to hold a meeting in this country in 1884.

Following this, considerable attention was devoted to the financial condition of the society, and the suggestion of Mr. Henry R. Towne to strengthen its basis by increasing the annual dues from \$10 to \$12 met with considerable opposition. Mr. Charles T. Potter, for example, considered the condition as anything but desperate, holding that future financial strength should be secured by a steady growth in membership, and that a radical change such as that proposed was by no means desirable. The prevailing opinion seemed to be that the present annual fee was ample, and that an extension of the society would yield desirable results. This growth, as remarked by one of the members, would undoubtedly be stimulated by the reading of more readily comprehensible papers—that is to say, papers embracing fewer complex formulae intelligible only to those who had enjoyed the advantages of a higher mathematical education. As to the progress made by the society in this direction within the past year, a brief outline furnished by Secretary Hutton gave some interesting particulars. From these it appeared that since November, 1882, up to the present time, 37 new members had been admitted, making a total of 454. Considering the fact that the time during which applications for membership were received did not cover a full year, the results could not but be regarded as highly satisfactory. At the same time, however, as stated by Mr. Towne, initiation fees cannot be relied upon for a very long period as fully sufficient to meet current expenses, and a further consideration of the financial question will, therefore, probably become necessary at no very distant date.

Having thus for the time being disposed of this subject, attention was given to the result of the annual election of officers, which was as follows: President, John E. Sweet; vice-presidents, A. B. Couch, W. R. Eckart, J. Vaughan Merrick; managers, W. F. Durfee, Charles C. Worthington, Oberlin Smith; treasurer, Charles W. Copeland; secretary, F. R. Hutton.

After the announcement of the names of newly-elected members, associates and juniors by Professor Hutton, President Leavitt called for Mr. J. C. Headley's paper on

A TILTING WATER METER FOR EXPERIMENTAL PURPOSES.

Lack of space precludes its extended notice, and we will consequently refer to it in detail in an early issue. The fact that the use of the apparatus is attended with important advantages as to accuracy in the measurement of water elicited interesting remarks from different members concerning water meters in general and errors arising from their use. The expansion and contraction with different temperatures of the materials employed in this construction, and the incorrect figures resulting from these causes, were referred to at some length, the discussion also embracing particulars relative to the varying measurements of water in Worthington meters for varying speeds of piston. In this, as well as in the discussion of the succeeding paper, a wide range of subjects was considered, some of the members apparently losing sight of the original topic. At the same time, however,

the particulars thus brought out were of an exceedingly interesting character, and close attention was given to the remarks on inaccuracies in thermometric indications of temperatures of water in feed pipes, owing to compression of the thermometer bulb, the use of mercury wells to obviate errors of this kind, and a variety of other equally interesting details.

The second paper read was that of Prof. Thomas Eggleston on

A MACHINE FOR OBSERVING THE PHYSICAL CHANGES OF METALS.

The machine, it appears, was suggested by the breaking of a rail on the Northern Railway of France, in the year 1873, different portions of which, when subsequently tested, were found to exceed the required degree of strength. The paper was prefaced by a short account on the breaking of rails and the fatigue of metals, in the course of which the author advocated discarding the term "hardness" and substituting "abrasive resistance." The term "hardness" was remarked to convey no distinct meaning, signifying in some cases brittleness, in others toughness, and in still others comparative softness. Without going into particulars, we would here state that Professor Eggleston's method of testing the hardness of metals, or their "abrasive resistance," as he would term it, embraced the use of a drill in connection with the specimen to be tested. This special point elicited considerable discussion, Mr. Towne suggesting that the operation of cutting the metal scarcely seemed to be a fair test, its accuracy depending upon the temper of the cutting tool, its angle, temperature of the material and other equally important factors. Again, when using a drill in the machine described, different portions of the tool worked at greatly varying speeds, and one of the members thought that by first drilling a small hole in the specimen operated upon, so as to allow only the more rapidly-moving points of the drill to perform work, more satisfactory results might be obtained. The use of lathe or planer tools was proposed as still other remedies for what were considered as defects in the appliance. As already stated in the preceding remarks, the discussion in this case also gradually drifted away from the original subject, interesting comments being furnished as to the manufacture and composition of brass, copper and copper castings.

Before the close of the meeting Professor Hutton read a letter from Prof. George W. Maynard, inviting the members of the society to visit the Hecla Iron Works, in Brooklyn. An invitation was also received from the Brooklyn Bridge authorities to cross the bridge in a special car.

tacked was crushed to the amount of $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{1}{4}$ inch respectively. In the experiments the fall of the drop varied from 3 inches up to 5 feet, and the weight of the drop from 50 to 2000 pounds. Inspection of the table showed that with a weight of 2000 pounds, falling through a height of 5 feet and producing a compression of $\frac{1}{4}$ inch, the pressure obtained was almost 1,750,000 pounds, while, with a weight of 50 pounds, a similar amount of compression and a fall of $2\frac{1}{2}$ feet, the pressure realized was 21,600 pounds. Professor Thurston further stated that the distortion produced by the action of the hydraulic press and the action of a hammer dealing a succession of blows to produce the same change of form consumed power in the ratio, in some cases, of 1 to 10 pounds. The reading of the paper was followed by a lively discussion, in which a number of members participated. Among them Mr. Morgan referred to the loss of effectiveness of the blows caused by insufficient weight of the anvils, thus distributing the power to the surrounding objects. Mr. Oberlin Smith's paper on

SHOP ALGEBRA

was the last one read at this meeting, after which Professor Hutton again referred in detail to the invitation of Prof. G. W. Maynard to visit the Hecla Iron Works, in Brooklyn. An invitation was also received from the Brooklyn Bridge authorities to cross the bridge in a special car.

Friday.

THE EXCURSION TO STAMFORD, CONN.

In response to the invitation extended to the society by Mr. Henry R. Towne, to visit the works of the Yale & Towne Manufacturing Company, at Stamford, Conn., the members met at the Grand Central Depot, on Forty-second street, shortly before 9 a. m. About 120 members were present, for whose accommodation two special cars had been provided, which were attached to the regular 9:05 a. m. local train. The weather was perfect and contributed its full quota toward the thorough enjoyment of the hour's ride to Stamford. The two cars were quickly, but comfortably, filled as soon as the doors were thrown open, and soon the buzz of "shop-talk" mingled with the smoke of the fragrant weed, and would have left no doubt in the mind of any one, as to the vocation of the travelers. The talk was kept up in spite of all that might have been said the previous evening as to the comparative "fatigue" of metals and of engineers, and the dark figure that moved along the aisles with gaily labeled cedar boxes and loose matches was unquestionably responsible for keeping up the smoke.

On arrival of the train at Stamford the two special cars were run into the company's yard, where the members of the society were received by Mr. Henry R. Towne and the reception committee, chiefly composed of gentlemen connected with the works. The first building visited was the iron and brass foundry, remarkable for its cleanliness—not usual attribute of a foundry—its excellent light and perfect ventilation. In this building Mr. Towne explained to the members the construction of a 5-ton Weston jib-crane, a full description of which, and the large traveling cranes manufactured by this company, will be found by referring to our earlier numbers of 1883. The brass furnaces with independent draft, and the novel use of band-saws for cutting off gates, attracted a great deal of attention. The division of the pattern shop, on the second floor of the foundry building, into two sections, one for wood and one for metal patterns, as well as the system of keeping and indexing the patterns, the excellent arrangements of the washstands and coat rooms, were very thoroughly appreciated by the visitors.

From the foundry building Mr. Towne led his guests to what is called the "post-office" building, from the fact that it is entirely devoted to the manufacture of post-office equipments—boxes, letter boxes, office windows, change counters, metal door and window signs, &c. In the erection room some complete sections of post-office boxes for the Philadelphia post office were greatly admired for their finish and beauty of design. In this building the attention of the visitors was called to the application of the overhead steam-heating system adopted throughout the shops of these works, and which we have already fully described in previous issues.

Crossing the yard, the pulley-block shop, devoted to the manufacture of Weston's differential pulley blocks, and the chain shop, were next inspected, in which latter all the chains used for pulley blocks, cranes and hoists manufactured by the works are made. The smaller sizes are all made from Norway rods, and the larger sizes from American iron of high ductility. The gauges used by the chain-makers are slightly below standard pitch. After being forged the chains are brightened by rattling, and then stretched in a special machine up to the final pitch or gauge. The strain thus applied is within the elastic limit, but has the effect of bringing the links to a permanent bearing with each other, and of giving such set to them that, when used within the intended limit of load, they will not alter their length. In this way a chain of uniform and permanent pitch is obtained, and one having the high qualities necessary for crane work.

From the chain shop the party entered the old "crane shop," which is now being fitted up for testing-machine and scale work. Here Mr. Towne explained the construction of a 6-ton Weston hand-power traveling crane, his remarks being illustrated by actual operation of the crane. In this shop was also found the newly erected Pratt & Whitney screw-cutting machine, capable of cutting the large 24-foot screws required for the Emery testing machines. Next the store and packing rooms, the "press room," where the stamping and punching of the lock department is done, and the bank-lock department were visited.

From there Mr. Towne led his guests back to the scale room, where the next hour was very comfortably spent in a thorough investigation of the constituent parts of an elegant collation. After coffee and cigars, the visitors rallied once more to the now familiar sound of Mr. Towne's whistle. He next led the way to the engine-room and boiler house containing a 20 x 42 inch Harris-Corliss engine, running 72 revolutions and developing

about 125 horse-power; also pit containing hot well, into which the condense water from the entire heating system of the works is returned, and containing also Worthington duplex pump, Berryman heater, &c.; also a battery of six tubular boilers, built by Beach & Son, of Hartford, with patent water fronts (dispensing with all brick setting about the fire-door), and Jarvis furnace setting, by means of which slack coal and other refuse is used as fuel, the present mixture consisting of one part of bituminous slack to 4 parts of anthracite peat and dust.

The party next entered the crane shop by the gallery containing the coat and wash rooms, from which an excellent view of the shop was obtained. This shop is 100 feet wide and 300 feet long, is divided into three aisles or bays, the center one having a clear span of 50 feet, and being used for heavy work and erecting and shipping purposes, the side aisles containing benches and light machine tools. Two Weston power traveling cranes, one of 20 tons and the other of 30 tons capacity, are in operation here, and their mechanism was explained by Mr. Towne. A short visit to the new—not quite completed—hammer shop followed, and then the party were conducted successively through the small lock department, the tool room and the "wheel room." In the latter some 24 men are employed in emery grinding, and it is to be noted that the atmosphere of the room is perhaps more free from dust than that of any room in the works. The removal of the injurious brass and emery dust is accomplished by large exhaust fans in the basement, the peculiar form of the hoods covering the wheels, and of the orifice leading from these to the exhaust tube, being important features.

Ascending another stairs a brief visit was made to the plating department, the first room of which contains the acid and soda tanks, &c., the second the buffing lathes for polishing by means of rag wheels, and the third the plating appliances, including the depositing tanks, dynamo machines, &c. Leaving the plating room the party entered the room in which the 75-ton Emery hydraulic testing machine is temporarily erected, and where a short series of tests of materials was made in the presence of the members. The testing machine is similar in general principles to the 400-ton Government machine at the Watertown Arsenal, but is of the upright type. It has a straining capacity of 15,000 pounds, applicable to tests of tension, compression, and transverse loads. It will receive specimens for tension up to 74 inches in length, and for compression up to 88 inches in length, with ample allowance for elongation. The supports for transverse strains can be separated 84 inches, and specimens of any length can be inserted. The construction and action of the machine was explained verbally during the process of making the tests.

Upon the conclusion of the tests the departing guests gave three rousing cheers for both Mr. Towne and Mr. Albert H. Emery, the inventor of the now world-famous testing machine. Descending the stairs the special cars were found in the yard, and the party were soon after carried to New York by the 5 p. m. fast express. The expressions of admiration of the perfect arrangements of the shops, the close attention to details, the evidences of superb discipline, as well as mechanical ingenuity, throughout the works were universal, and the excursion was unanimously voted not only a most interesting one, but "a perfect success."

Evening Session.

The evening session began shortly after 8 o'clock, and, as proposed by Professor Thurston on the preceding day, the first subject taken up was the discussion of the amendment relating to the election of officers. Though the plan at present followed by the society in this matter was considered tolerably safe, improvements could undoubtedly be suggested, and the matter was consequently referred to a special committee. Mr. C. J. H. Woodbury was then called upon to read a paper on

EXPERIMENTS ON NON-CONDUCTORS FOR STEAM PIPES.

which, owing to its great length and thorough discussion, occupied the greater portion of the evening. We cannot even attempt to here give it the attention it deserves, but would simply mention that the experiments were considered by some as having been carried out on too small a scale to give practical results.

Considerable interest was attached to President Leavitt's remarks as to non-conducting boiler coverings, consisting of mixtures of plaster-of-paris and sawdust, and also to the experience of others as to corrosion of pipes resulting from the effects of moisture in the non-conducting material. Mr. Leavitt remarked that his mixtures were in the proportion of one part of plaster-of-paris and two parts of sawdust, and the estimated cost of the material, its preparation and application, was 12 cents per square foot. As an example illustrating the efficiency of the covering, Mr. Leavitt cited the fact that in boilers protected in this manner, and burning about 20 tons of coal in 24 hours, the outside temperature at distances not exceeding 6 feet was in a number of cases found to be zero degrees during the winter. In response to a special request, Professor Thurston gave a brief abstract of his paper on "The Theory of the Turbine," lack of time preventing its more lengthy consideration. He also referred to the fact that a mechanical section had been recently organized by the American Association for the Advancement of Science, and that additions to its list of members from the Society of Mechanical Engineers would be warmly welcomed. Professor Hutton then read the following papers by Title: "Motive Curves for the Slide Valve," by A. W. Robinson, and "Compression as a Means of Governing Engines," by Harris Tabor. Before adjournment resolutions of thanks were offered to the retiring and retired officers of the society for their efficient services, and also to the American Society of Civil Engineers; the New York, West Shore and Buffalo Railway; Mr. Henry R. Towne, Prof. Geo. W. Maynard, and all others who had been instrumental in contributing to the entertaining features of the meeting. The members separated shortly before 11 p. m., with pleasant anticipations as to Saturday's trip to Kingston, N. J., on the line of the New York, West Shore and Buffalo Railway.

Special Notices.**To Brass Foundries.****To Brass Manufacturers.**

Our new foot press, for cutting off GATES from brass castings by FOOT power, is now ready. Weight, 250 lbs. Price complete, \$300 net. You can operate it easily. We will send you a sample to give you perfect satisfaction. PEERLESS PUNCH AND SHEAR CO., 38 W. Dav Street, New York.

For Sale or Lease.**A Large Two-Story Brick Factory,**

Formerly Machine Works, at Pearl River, N. Y., on railroad depot, 25 miles from New York City. Railroad facilities unexceptionable, on the line of the New Jersey and New York Railroad. The property contains 40,000 square feet floor space, with one 80 H. P. Engine and Boiler, 720 ft. 2-inches square shafting and pulleys, main beams, steel girders and wrought pipes throughout the building. A splendid iron foundry, 72 ft. by 60 ft., with one reversing cupola, with Mackenzie blower, brass furnace, coke oven, blacksmith shop, pattern vaults, annealing oven, etc. The property can be bought or leased on liberal terms. For further particulars, price, terms, etc., address J. E. B. & Co., 113 Liberty St., New York, or Pearl River, Rockland Co., N. Y.

For Sale.**A FIRST-CLASS JOBBOING HARDWARE AND TINNERS' STOCK BUSINESS,**

located in a Western city. Well established, profitable, capable of large increase. Satisfactory reasons for selling. All or part to be sold; small proportion of cash; balance on long time if properly secured. Address, for correspondence or personal interview,

M. C. & C. C.

Office of *The Iron Age*, 83 Reade St., New York.**For Sale.**

The largest stock of New and Second-hand Engines, Boilers, and general Machinery in the West, send for Catalogue. Hoisting Outfits for Coal Mining and other purposes a specialty.

WARREN SPRINGER,

195 to 219 South Canal St., Chicago.

For Sale.

Second-hand

DROPS and LIFTERS.

BEECHER & PECK,

Lock Box 122, New Haven, Conn.

STEAM PUMPS**For Sale.**

A large number of Steam Pumps of all makes, and ranging in size from small tank or boiler feeds up to very large service machines.

While the stock lasts good bargains are open for Miners, Water Works, Rolling Mills, Furnaces, or any one needing to move fluids by steam.

Call upon or address,

JNO. A. HINCKLEY,

Purchasing Agent of the United Pipe Lines,

Oil City, Pa.

For Sale.**MACHINES FOR MAKING PICKS, MATTOCKS AND AXES,****With Solid Punched or Adze Eyes.**

T. & CO., Box 25.

Office of *The Iron Age*, 83 Reade St., New York.**For Sale.****TREBLE AND DOUBLE-GEARED 25-INCH ENGINE LATHEES,**

from new patterns.

GEORGE A. OHL & CO.,

East Newark, N. J.

Valuable Iron Property for Sale.

An Iron Property in Central Pennsylvania on the main line of the Pennsylvania Railroad. Large bodies of Hematite and Fossil Ores, well developed. Modern appliances for the preparation of the Ores. Situated close to the coal seams of the Clearfield, Broad Top and Alleghany Mountains. Coke from Connellsville can be laid down at \$2.35 per ton. A ton of Pig Iron can be made for about \$13 per ton, exclusive of interest and taxes. The property has one general Furnace and Forge, and an abundant supply of Timber for making Charcoal. Satisfactory reason can be given for selling. Apply, for further particulars, to

W.M. DORRIS,

Huntingdon, Pa.

For Sale.**EAST IRON HOT-BLAST PIPES—THOMAS PATENT.**

13 Hot-Blast Oven Pipes for Thomas Oven, in first-class order. Price, 1 cent per lb., cash, at our works. Size, 13 ft. x 9 inches. A bargain. SHOENBERGER, SPEER & CO., Pittsburgh, Pa.

To Lease.

From May 1, 1884, for a term of years, at a low rental, to a satisfactory lessee, the manufacturing property at New London, Conn., lately occupied by the Brown Cotton Gin Company. The ground comprises over 50,000 square feet. The buildings and sheds under roof measure over 25,000 square feet, of which about 20,000 feet are metal roofs. An Engine, Boiler, shafting, &c., &c., are on the premises. The property is very conveniently located for manufacturing purposes. Its entire eastern line is bounded by the land of the Shore Line Division of the N. Y., N. H. and Hartford R. R. Co.

For further particulars, apply to
Messrs. J. C. LEARNED & SON,
New London, or to
B. HAXTON,
172 Centre St., New York.

Wanted.

A Partner with \$5000 to \$10,000 in a Foundry and Machine Business, established in 1884. For particulars, inquire of

L. H. COLLIER,

Poughkeepsie, N. Y.

A THOROUGH HARDWARE MAN

of experience is open to negotiation as Salesman, Manager or Buyer. Address, RELIABLE, Office of *The Iron Age*, 83 Reade street, New York.

Trade Report.**BRITISH IRON AND METAL MARKETS.**[Special Cable Dispatch to *The Iron Age*.]

LONDON, WEDNESDAY, Nov. 7, 1883.

Scotch Pig.—The market is not so steady, and prices are weak through disposition on the part of holders to realize. Makers' brands are quoted as follows:

Coltness, alongside, Glasgow	57/-
Langloan	56/-
Gartsherrie	54/-
Summerlee	55/-
Carnbroe	54/-
Glasgow	58/-
Ardrossan	47/-
Houston	47/-
Dalmellington	39/-
at Leith	39/-
Lighterage from Ardrossan to Glasgow	1/-

Coltness, alongside, Glasgow 1/-

Cleveland Pig.—During the past month stocks have decreased. Prices are weaker. We quote as follows, f.o.b. shipping ports:

Middleboro' No. 1 Foundry	41/-
No. 2	40/-
No. 3	38/-
No. 4 Forge	37/-

Lighterage from Middleboro' to Cleveland 1/-

Bessemer Pig.—The market is a little weaker. W. C. Hematites are quoted 47/- @ 48/- for Nos. 1, 2 and 3, equal parts, f.o.b. shipping ports.

Blooms.—But little doing.

Manufactured Iron.—The market is a little firmer. We quote at works:

	£ s. d.	£ s. d.
Staff. Ord. Marked Bars	7 10 0	7 10 0
" Medium	6 5 0	6 15 0
" Common	6 0 0	6 0 0
Hoops, 20 W. and over.		
" Common Best	7 0 0	7 5 0
" Medium	6 5 0	6 15 0
" Common	6 10 0	6 0 0
Sheets, 20 W. G. and under.		
" Ordinary Best	8 15 0	9 5 0
" Common	8 0 0	8 0 0
Welsh Bars	5 5 0	5 7 6

Steel Rails.—Are a little weaker. We quote £4.15/- @ £5.10/- for Ordinary Sections, f.o.b. shipping ports.

Iron Rails.—But little doing.

Old Rails.—The market is a little firmer. We quote Old Tees £3.12/6 @ £3.15/6, and Old D. H.'s, £3.15/6 @ £3.17/6, c.i.f. New York.

Serap.—The market continues quiet. We quote Heavy Wrought, £3.12/6, c.i.f. New York. Bessemer Crop Ends, run of the mill, are quoted 60/-, f.o.b. shipping ports.

Copper.—The market is steady. Best Selected is quoted at £67 @ £68, and Chili Bars, £61 @ £61.15/6.

Tin.—The market is a little weaker and prices are lower. We quote Straits, Ingot, spot, £92 @ £92.10/-, and futures, £91.15/- @ £92.5/-.

Tin Plates.—A large business has been done during the week. Prices are not so steady, and show a tendency toward lower figures. We quote:

Tin Plates, 10 x 14, 1st qual. Charcoal	19/6 @ 21/6
" 2d "	18/6 @ 19/6
" 1st " Coke	17/6 @ 18/6
" 2d " "	10/6 @ 16/6

Spelter.—The market is firmer. We quote Ordinary, at shipping ports, £15.7/6 @ £15.15/6.

Lead.—Prices are firmer. Common English Pig is quoted £12 @ £12.2/6.

Freights.—Steam from Glasgow to New York, 5/- @ 6/-; Liverpool to New York, 4/- @ 5/-; Liverpool to Philadelphia, 5/- @ 6/-; and London to New York, 7/6 @ 9/6.

Government Bonds at the Close to-day

were as follows:

	Bid	Asked
U. S. 4½%, 1891, registered	113½	118½
U. S. 4½%, 1891, coupon	114½	114½
U. S. 4%, 1897, registered	121½	122½
U. S. 4%, 1897, coupon	120½	122½
U. S. 6 per cent.	100½	—
U. S. Currency 6s, 1895	130	—
U. S. Currency 6s, 1896	132	—
U. S. Currency 6s, 1897	134	—
U. S. Currency 6s, 1898	136	—
U. S. Currency 6s, 1899	137	—

State Bonds Tennessee compromised sold at 40½%.

TRADE AND FINANCE.—A comparison of the volume of business for October with that of the same month last year indicates that there has been no material falling off, but that an average amount of goods has been disposed of.

The demand is continuing with fair steadiness, a great many small orders still coming in.

That the stocks in dealers' hands are small and broken is indicated by the frequency

and urgency of their orders, the goods being in most cases wanted at once, and usually by express.

These orders are in many cases

for small quantities, so that the merchants here and manufacturers are apt to complain

that they have to carry the stocks for their

customers; yet the aggregate of such busi-

ness is considerable, and foots up more than

the sellers anticipated.

The volume of trade for the past week has been somewhat af-

fected by the elections in the different

States, but the condition of the market has

not materially altered since our last report.

The export demand during the season has

been good, and houses with trade abroad are

in most cases well occupied.

We are not called upon to record important

changes of prices, most

views may be expressed concerning any matters connected with the Hardware trade : " GO WEST."

To the Editor of *The Iron Age*: The mania for delivering merchandise to their Western jobbing customers free of freight, which seized the manufacturers of Hardware some years since, has increased in frenzy and extent until retailers, as well as jobbers, are beneficiaries, and the Rocky Mountains, instead of the Hudson River, constitute the Western line of free delivery. Before the days of American Hardware a stock of goods cost the merchant more money laid down in St. Louis than in New York, while at the present day there is no appreciable difference. The American manufacturer kindly pays freight to the very doors of Western dealers, not because of competition from Western manufacturers, but on account of his own innate goodness and liberality, which prompt him to pave the Western road to fortune with fragments of his own profits. This change doubtless originated in the equalization of freights between different manufacturing points and the markets to which the products were shipped. The equalization grew to be free delivery, and gradually the boundaries were widened, until an order date in a Western city that does not read "f.o.b. here" is phenomenal. Manufacturers having no competition requiring equalization of freights became imbued with the spirit of the age, or were inveigled by their Western customers into prepaying freights upon their wares or allowing the transportation charges to be deducted from their invoices.

This rage for free delivery has been carried to an extreme that renders it positively ridiculous. Take, for example, the plan adopted by the two manufacturers of Tubular Lanterns (who are in combination), one located in New York City, the other in Rochester, N. Y. They have no competition, and are under no obligation to deliver their goods beyond the doors of their respective factories. Nevertheless, they fix the price to charge a New York jobber at \$8 per dozen, but allowing their philanthropy to get the better of their own interests, they sell the same goods to customers who are undergoing the trials and privations of frontier life at a greater or less reduction from the New York price. Chicago pays \$7.75; Omaha, \$7.40, and Denver, \$6.40 per dozen. Isn't that consistency? Goods not manufactured west of New York City are delivered free in St. Paul. Further than this, like favors are being granted to retailers in remote towns, as well as jobbers in large cities. A Philadelphia jobbing house is now engaged in delivering Wrought Butts, Strap Hinges, &c., manufactured in New England, to dealers in Blackberry Grove and Crawford Corners, Wis., at New York prices, and at the manufacturer's expense for freight.

With this unjust discrimination on the part of manufacturers against New York, Philadelphia and Boston, two alternatives present themselves to Eastern jobbers—the one, to insist upon manufacturers allowing Chicago, Dubuque, Omaha or Denver freights on all their purchases, enabling the Eastern jobber to make free deliveries to Western points; the other, to "go West." If a Western dollar possessed greater value in the eyes of a manufacturer than an Eastern dollar, if Western business is to command a premium and be fostered at the expense of Eastern business, or if goods are no longer worth their freight, it is high time that all jobbing Hardware houses should be transferred to the West. Will this unjust discrimination always prevail, or will manufacturers eventually go out of the transportation business?

Respectfully, JOCKER.

An extensive auction sale of Hardware and Cutlery took place last week, in accordance with the announcement made in these columns, at the auction rooms of E. Bissell & Co. The attendance of Hardware buyers was good, and many dealers out of the city were represented. The sale as whole was quite satisfactory, but the Hardware which was offered went rather slowly. Cutlery did not sell as well as in the September sale, but a large quantity of goods was disposed of. Carvers and goods suitable to the season went especially well and commanded fair prices. The retail city trade took many of the goods, but considerable quantities were disposed of to wholesale buyers, and to houses out of the city whose orders had been sent, with discretionary power, to the auctioneers.

A circular has been issued to the trade by the Morris Sash Lock Manufacturing Company, of Cincinnati, with reference to the patent granted in September last to the Kempshall Company. This Kempshall patent, they claim, should be declared void, as being substantially the same thing as their Mr. Morris's prior patent, and to have the question settled they announce that they have instituted a suit against the Kempshall Company.

The following communication, which informs the trade of the changes made in the firm of Lockwood, Van Doorn & Taylor, of Cleveland, Ohio, on account of the death of Mr. Charles U. Van Doorn, has been received, and we take pleasure in laying it before our readers:

The business conducted by the late firm of Lockwood, Van Doorn & Taylor will be continued by C. B. Lockwood and M. Taylor, members of the old firm, and B. L. Pennington, who has this day become a member of the new firm, under the firm name of Lockwood, Taylor & Co. With increased capital, our purpose is to largely increase our line of goods, and, by careful attention to business, deserve the confidence so cordially extended by the trade to the old house. Our effort will be to make our business relations with all our correspondents of mutual benefit, and we trust that the confidential and friendly relations that have so long existed with the patrons of the house may continue, and many new ones be formed. The members of the firm will devote their entire time to the business, and all correspondence will have their

personal attention. Realizing that our past prosperity is largely due to the partiality of our many friends, we are determined to merit their continued confidence. The new firm have purchased the stock and all claims or credits due the old firm, and assume its obligations.

C. B. LOCKWOOD,
M. TAYLOR,
B. L. PENNINGTON,

CLEVELAND, November 1st, 1883.

Flagler, Forsyth & Bradley, No. 298 Broadway, New York, have been appointed agents in the Eastern States for the Phillips American Roller Skate, made by Merchant, Phillips & Co., Richmond, Ind. This Skate is made under a patent June 26th, 1883, and is put upon the market as an article to meet the demand for a good Roller Skate. Among the special points which are made in its favor are these—that it has exceptionally large wheels; that the trucks are perpendicular, thus relieving the bearings from wear and strain; and that the side or lateral motion is obtained by a post, through which passes a highly-tempered steel wire, connecting the trucks, thus giving every truck exact and equal tension and dispensing with rubber and set screws, the arrangement of which is often troublesome. The construction of the skate may be seen from the illustration in the advertisement on another page. This skate is made of the following sizes :

No. of shoe.....	12 or 12½	13 or 13½	1 or 1½
No. of skate.....	7	7½	8
No. of shoe.....	2 or 2½	3 or 3½	4 or 4½
No. of skate.....	8½	9	9½
No. of shoe.....	5	6	7 or 8
No. of skate.....	10	10½	11
			11½

The goods are finished with ebonized wood top, strapped, and with patent buckle, and sold from the following list, which is subject to a discount of 15 per cent. :

1 pair.....	\$4.00
2 pairs.....	per pair, 3.75
5 pairs.....	3.50
50 pairs, or more.....	3.25

Nickel-plated, \$1 per pair extra.

The Pawtucket Manufacturing Company, Pawtucket, R. I., which was incorporated a little more than a year ago, are energetically pushing the making of Bolts, Cold Pressed Nuts and Washers, Iron and Steel Set Screws, &c. They have published a chart of some of the Bolts they manufacture, illustrating regular and special kinds, which will be of interest to persons using such Bolts, especially those who are operating textile machinery.

There is a good demand for Wrought Iron Goods, the manufacturers of Wrought Hinges and Butts being in most cases well occupied on orders. The Stanley Works, New Britain, Conn., are vigorously pushing the manufacture of Tacks, and having machines constructed for this purpose.

Our attention has been called to an attractive novelty in the line of Hardware holiday goods. It is an iron Savings Bank, called the "Presto." When a penny is deposited, and while a person is looking at it, the coin is apparently transformed into a twenty-five cent piece. This toy and curiosity is sold at \$12 per dozen, subject to a discount of 25 per cent, and is manufactured by the Clark Hardware Company, of Detroit, Mich., who are represented in this market by W. H. Goldey, No. 103 Chambers street.

Horace F. Sise, 100 Chambers street, has recently put on the market the "Arlington" Three-Jawed Chuck, for Drills o to 1/8 inch full, which is designated in his list as No. 52. The list price is \$2 each, discount 25 per cent.

The Rule manufacturers report a fair trade during the past month, with a well-sustained demand at present. Prices remain substantially unchanged, the regular discount being 70 and 10 per cent. on Boxwood, and 55 and 10 on Ivory. In Try Squares and Bevels there is no change to note.

The following is the list of August Krauss's French Grindstones, of which a full line is kept in stock by the Francis T. Witte Hardware Company, 111 Chambers street, New York :

Single stone.	Per dozen.
3 in. diam., 2 in. thick.....	\$0.30
4 " " "35
5 " " "40
6 " " "50
7 " " "60
8 " " "70
9 " " "80
10 " " "90
11 " " "	1.00
12 " " "	1.20
13 " " "	1.30
14 " " "	1.40
15 " " "	1.50
16 " " "	1.75
17 " " "	2.00
18 " " "	2.25
19 " " "	2.50
20 " " "	2.75
21 " " "	3.00
22 " " "	3.25
23 " " "	3.50
24 " " "	4.25
25 " " "	4.50
26 " " "	4.75
27 " " "	5.25
28 " " "	5.65
29 " " "	6.00
30 " " "	7.00
31 " " "	8.00
32 " " "	9.00
33 " " "	9.75
34 " " "	10.50
35 " " "	11.00
36 " " "	12.00

Discount, to the trade only, 15 per cent.

The Victor Door Hanger, which is illustrated in our advertising columns, is made of three sizes, according to the following list, which has been reduced from that heretofore published :

No. 1, for Doors 3 to 6 feet wide.....	\$15.00
No. 2, " " 6 9 "	16.50
No. 3, " " 9 12 "	18.00

from which there is a discount of 33 1/3 per cent. The Track Rail is made in 2-foot sections, and sold at 10 cents a foot, subject to a discount of 40 per cent.

Messrs. John P. Lovell & Sons, Boston, are out with a catalogue of Breech-Loading Shot Guns, Revolvers and Pistols, representing a very complete line. The catalogue

mentioned is a large pamphlet of a dozen or more pages, in which full-size illustrations of twenty different patterns of Revolvers and Pistols are shown, all of which are described and prices named in a concise manner for the various calibers and grades of finish. Prominent among these revolvers we notice the names of the "American Bull Dog," "Smoker," "Defender," "Tycoon" and "Favorite," with others familiar to the Hardware and sporting-goods trade. An entire page of this catalogue is devoted to a large cut and the description of their new Model Top Snap "Champion" Breech-Loading Shot Gun, made with Rebounding Lock, Patent Fore-End Fastening and Pistol Grip Stock, with other explanations of the merits of this Gun, for which the manufacturers claim a high standard of excellence. Prominence is also given in this catalogue to cut of the "American Bull Dog, Double-Action Revolver," with a complete description of this line, which is claimed, for its durability, rapidity in firing, accuracy and penetration, to be excelled by none other. These mentioned are a few of the many illustrations that appear in this book designed for the use of the leading Hardware and Gun houses, by whom these goods are sold.

The announcement of the formation of a new concern for the manufacture of Handles is made in the following communication which has been sent to us for publication :

NEW YORK, November 2, 1883.

To the Trade: We have recently commenced manufacturing, at Richland Center, Pa., Ax, Pick, Sledge, Hatchet and Hammer Handles, and also a full line of Carpenters' Tool Handles, and are now prepared to offer inducements on the goods. Catalogues will be furnished by January 1, 1884. All communications should be addressed to W. H. Goldey, No. 103 Chambers street, New York, who will sell our entire product.

GOLDEY HANDLE COMPANY.

IRON.

There is generally some interference with business during election week, and the past seven days have not been an exception to this rule. The trade in Bar Iron, Merchant Steel, Pig Iron and Sheet Iron suffered for this reason. As election day is a legal holiday in this State, there was no business whatever done on Tuesday in this city, so that the volume of the week's transactions was much less than that of the week previous. This will be plainly apparent from the details concerning the trade in each branch which are given below.

American Pig.—The quantity of Foundry Pig sold fell very much under the quantity disposed of during the week previous. A feature of the market, however, was the appearance of some buyers seeking to secure stock for shipment before the close of navigation. From this and other causes there are fair orders in sight, and sellers anticipate an active week. Gray Forge has been in better demand again, and sales were made to a considerable extent, with inquiries for further large lots which will probably lead to business. Prices are weaker for Foundry Irons, though we make no change in quotations, which are, for No. 1, \$20.50 @ \$21, with sales of fancy brands at various prices up to \$23; No. 2 Foundry, \$19 @ \$20. Gray Forge sells at \$17 @ \$17.50 at furnace, equal to \$18 @ \$19, delivered.

Foreign Pig.—The arrivals of Scotch Iron have recently been very light, but the small quantity arriving unsold is quite difficult to place under present circumstances, with good American brands selling so low. A demand from the West has resulted in some sales for delivery before the close of canal navigation. The local demand is exceedingly dull. The market is weak, but quotations are practically unchanged, as follows: Carnbroe, \$22 from ship; Coltness, \$23 to arrive, and \$23.25 from ship; Shorts, \$22.75 @ \$23 from ship; Glengarnock, \$22 from ship; Gartsherrie, \$23 from yard; Langloan, \$23.25 from ship; Summerlee, \$22.50 to arrive, and \$23 from ship; Dalmellington, \$20.75 to arrive, and \$21 from ship; Eglington, \$20.50 @ \$21 to arrive. We hear of no transactions in Bessemer or in Middlesboro' Pig.

Spielleisen.—Sales to limited extent have been made at \$30.25 @ \$30.50 for Foreign, and \$30. for Domestic 20%. The New Jersey Zinc and Iron Company, No. 52 Wall street, this city, report that their Newark furnaces are now, and have for the past three months been, making Spielleisen of the most excellent quality, grading uniformly at 20%.

Bar Iron.—Store prices are steady under a fair demand. Mill agents report business very dull, owing to the slackness of work among the machine shops of this vicinity. Up to a comparatively recent period these shops have been quite busy on orders, but as contracts were filled none came in to take their places; hence the somewhat sudden cessation of business. The mills are restricting production, however, and we do not hear so much of very low prices as was the case a week ago. We quote: Best Refined, 1.85¢ @ 2.2¢ at mill, and 2.2¢ @ 2.3¢ from store; Common Iron, 1.7¢ @ 1.75¢ at mill, and 2¢ @ 2.1¢ from store.

Structural and Shaped Iron.—As anticipated, the demand is gradually falling off from week to week. Prices are changed but slightly from last week's quotations, and are now, for Beams, 3.5¢ on wharf for round lots; Angles, 2.6¢ @ 2.8¢ from store; Tees, 3.4¢ @ 3.5¢ from store.

Plate Iron.—We are able to report the condition of this branch of trade as somewhat better. Orders are coming in more freely, and the stagnation of the past few weeks has given way to a perceptible movement, which, though not large, is very well come. We quote as follows: Common or Tank, 2.5¢ @ 2.6¢; Refined, 2.75¢; Shell, 3¢ @ 3 1/2¢; Flange, 4¢ @ 4 1/2¢; Extra Flange, 4 1/2¢ @ 5¢.

Sheet Iron.—There is a general concurrence in the statement that the past week has been exceedingly dull, especially as regards the demand for Thin Sheets. This is due to two reasons—first, the mildness of the weather, which prevents a brisk demand for stoves, and, second, the dullness among the manufacturers of utensils, &c. The first cause of the dullness will, of course, be favorably affected by the advance of the season, but when the second will be corrected is only a matter of conjecture, to be determined possibly by the course of general business. There is a steady demand for Heavy Sheets. We quote on the basis of 3¢ @ 3.5¢ for Nos. 10 to 16. Lighter sizes are quoted in our New York Wholesale Price List.

Steel.—The demand is of a hand-to-mouth character, most houses complaining of the volume of trade as well as of the low range of prices. The limited business now being done by local machine shops is responsible for the dullness in this branch of the trade. We continue to quote American Tool Steel at 11¢, with a concession to large buyers; Crucible Machinery, 6 1/2¢ @ 7¢; Bessemer and Open-hearth Machinery, 3 1/2¢ @ 4¢; Toe-calk, 3 1/2¢ @ 3 1/2¢; Boiler Plates, 5 1/2¢ @ 5 1/2¢, with extra for special sizes; English Tool, 15 1/2¢.

Wire Rods.—We hear of no movement in Steel Rods, but there have been a few sales of Iron Rods. American works which use Iron Rods have been experimenting for some time with various qualities of foreign Rods, and it is likely that a considerable quantity will be purchased by them soon. German Iron Rods are quoted \$4.8 @ \$5.75.

Steel Rails.—The attempt of the manufacturers to restrict production has been unsuccessful, and prices have consequently suffered seriously during the past week. Large blocks of Rails have been sold by Eastern mills at \$35 per ton for winter and early spring delivery. Perhaps 50,000 tons have been sold at this price, which is a drop of \$2 on the sales last reported in this market. Other sales, amounting to nearly 15,000 tons, have been made at prices ranging between \$35 and \$36. We quote \$35 @ \$36 at mill, according to time of delivery and location of mill. There are rumors in circulation that the New York Central and Hudson River Railroad Company have contracted for large quantities of English Steel Rails, but Mr. B. G. Clarke, of the Lackawanna Iron and Coal Company, says: "I visited Treasurer Clark,

EXPORTS

of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the week ending November 6, 1883.

Dutch West Indies. British East Indies.

Quan. Val. Quan. Val.

Palm. gals... 4320 \$577
Wt. iron, pkgs. 88 98
Mach'y. pkgs. 94 2,915
Bell. 1 21
Buckles, cs. 2 60
Pumps, pkgs. 3 81
Scales, cs. 28
Clocks, bxs. 7 32
Hdw., cs. 1
Dutch East Indies.
Palm. gals. 385,000 39,575
Bremen.
Palm. gals. 78,804 55,251
Hdw., cs. 52 1,054
Sew. ma., cs. 8 249
Ag. imp., pkgs. 2 130
Mach'y. pkgs. 1 600
Pkg. pres., bxs. 18
Mf. iron, pkgs. 1 50
Amsterdam.
Pig prs., pkgs. 2 658
Hdw., pkgs. 47 1,068
Tin ashes, cs. 2 200
Clocks, case. 1 71
Pumps, pkgs. 5 250
Rotterdam.
Palm. gals. 199,400 17,576
Hamburg.
I. rollers, case. 40
Guns, cas. 1 37
Ag. imp., pkgs. 55 250
Pump, bxs. 21
Sew. ca. 31 219
Mach'y. pkgs. 3 413
Palm. gals. 232,000 23,000
Clocks, cs. 76 1,764
Sew. ma., cs. 1740 27,207
Christiania.
Hdw., cs. 73 350
Copenhagen.
Mach'y. pkgs. 1 135
Hdw., pkgs. 11 350
Liverpool.
Hdw., pkgs. 34 875
Copper, bars. 5,604
Scales, bxs. 21 280
Mf. iron, pkgs. 7 182
Cop. mat., bgs 500 6,000
Clocks, pkgs. 19 1,000
Mach'y. pkgs. 4 190
Carbunes, cs. 5 1,675
Sew. ma., cs. 14 312
Nickelpale, cs. 3 115
Ore, case.... 1 25
Palm. gals. 183,130 80,520
Antwerp.
Mach'y. pkgs. 8 2,604
Palm. gals. 373,270 28,050
Gloucester.
Palm. gals. 322,585 17,500
Great Yarmouth.
Palm. gals. 140,559 12,150
Hull.
Mach'y. pkgs. 1 180
Hdw., pkgs. 226 3,521
Ag. imp., pkgs. 2 140
Bristol.
Palm. gals. 1,045,244 88,245
Roller mill.... 1 2,000
London.
S. rollers, pkgs. 125 500
Pump, pkgs. 3 175
Palm. gals. 370,154 75,879
Sew. ma., cs. 1 4,129
Hdw., pkgs. 140 4,971
Scales, cs. 19 47
Iron safes.... 8 600
Clocks, bxs. 43 13,900
Mach'y. pkgs. 54 1,534
Saws, cs. 19 74
Wringers, cs. 2 59
Ag. imp., pkgs. 95 1,259
Cartridges, case. 1 30
Mf. iron, pkgs. 9 300
Glasgow.
Hdw., pkgs.... 8 520
Boiler, cs. 1 145
Ag. imp., pkgs. 6 340
Clocks, cs. 75 1,500
Saws, cs. 34 57
Mach'y. pkgs. 16 1,490
Mf. iron, pkgs. 13 282
British West Indies.
Scale. 1 20
Mf. iron, pkgs. 100 540
Cartridges, cs. 2 90
Palm. gals. 8,760 995
Buckles, case. 1 145
Mach'y. pkgs. 1 73
Nails, kegs. 8 35
New Zealand.
Hdw., cs. 2 100
British Australia.
Wringers, cs. 40 870
Ag. imp., pkgs. 11 183
Sawmills. 1 335
Guns, cs. 2 235
Mf. iron, pkgs. 90 2,813
Sew. ma., cs. 201 4,234
Nails, cs. 3 83
Revolvers, case. 1 36
Palm. gals. 63,390 8,606
Clocks, bxs. 255 3,414
Hdw., pkgs. 674 10,851
Axes, cs. 31 1,100
Cartridges, cs. 2 64
Mach'y. pkgs. 16 814
Cutlers, cs. 32 395
Nickel, case. 1 109
Carbunes, cs. 3 360
New Brunswick.
Palm. gals. 51,250 6,525
Pig iron, tons. 100 2,165
Ag. imp., pkgs. 5 24
Havre.
Pumps, pkgs. 7 400
Ag. imp., pkgs. 149 7,103
Copper, pigs. 260 32,000
Pumps, cs. 3 65
Tacks, cs. 18 230
Mach'y. pkgs. 12 2,230
Palm. gals. 409,017 34,376
St. Loubes.
Palm. gals. 271,650 20,500
Rouen.
Clocks, pkgs. 113 1,882
Palm. gals. 345,000 25,200
Les Sables D'Olonne.
Palm. gals. 124,862 8,736
Dunkirk.
Palm. gals. 559,037 46,404
Marseilles.
Clocks, bxs. 18 250
Palm. gals. 221,815 14,411
Ag. imp., pkgs. 8 200
Cete.
Palm. gals. 219,559 17,290
French West Indies.
Palm. gals. ... 207
Malaga.
Palm. gals. 166,498 16,120
Sew. ma., cse. 1 228
Cuba.
Mach'y. pkgs. 1356 73,011
Hdw., pkgs.... 103 3,053
Copper, pigs. 260 32,000
Pumps, cs. 3 65
Tacks, cs. 18 230
Mach'y. pkgs. 12 2,230
Palm. gals. 409,017 34,376
Lisbon.
Clocks, pkgs. 113 1,882
Hdw., pkgs. 18 423
Naples.
Hdw., pkgs. 6 70
Genoa.
Sew. mch., cs. 56 1,910
Ag. imp., cse. 1 25
Copper boilers 2,551
Hdw., pkgs. 22 314
Uruguay.
Palm. gals. 847,210 87,240
Constantinople.
Ag. imp., cse. 1 67
Sandwich Islands.
Palm. gals. 200,000 207
Malaga.
Palm. gals. 166,498 16,120
Sew. ma., cse. 1 228
Japan.
Mach'y. pkgs. 1356 73,011
Hdw., pkgs.... 103 3,053
Mf. iron, pkgs. 3 70
Copper sheets 18 230
Clocks, cs. 8 480
Metars, cs. 4 480
Iron, pkgs. 71 142
WV's, pkgs. 26 290
Nails, cs. 34 448
Cutlers, cs. 37 26
Tinfoil, case. 1 60
Valves, cs. 5 131
Wires, cs. 67 67
Ag. imp., pkgs. 18 510
Palm. gals. 100,353 235
Sew. ma., cse. 17 410
Brassgds., cse. 1 188

FOREIGN TRADE MOVEMENTS.

Included in the imports for the week ending November 2 were leading articles of merchandise valued as follows:

	Pkgs.	Value
Anvils.	42	\$440
Brass goods.	77	6,345
Bronzes.	55	7,814
Chains and anchors.	65	6,55
Clocks.	111	13,698
Copper.	59	59
Cutlery.	82	27,023
Guns.	112	19,227
Hardware.	82	1,024
Horse, iron, tons.	3,044	34,797
Iron, sheet, tons.	66	4,739
Iron, cotton ties.	1,617	60,775
Iron, other, tons.	550	1,235
Metal goods.	210	23,734
Machinery.	183	9,842
Nails.	1	6,345
Needles.	14	6,835
Nickel.	6	1,753
Old metal.	4,131	4,131
Patina.	1	1,133
Platinated.	5	575
Pins.	29	2,032
Saddlery.	21	2,032
Steel.	28,903	50,081
Steel blooms.	191	235
Silverware.	11	1,238
Tin, bxs.	25,012	161,994
Wire.	341	5,326
Zinc.	62,615	2,512

The imports of hardware and metals compare with previous dates as follows:

	For the week.	Same week.	For 1882.	Same time.
Cutlery, pkgs.	82	6,472	6,345	6,345
Hardware, pkgs.	32	1,016	885	885
Iron, R. R. bars.	10,789	99,638	99,638	99,638
Lead, pigs.	10,459	29,833	29,833	29,833
Steel, pkgs.	23,993	24,461,994	1,688,881	1,688,881
Tin, bxs.	35,012	1,889,150	1,881,780	1,881,780
Tin slabs, lbs.	20,097,550	17,501,135	17,501,135	17,501,135

COAL.

Coal authorities agree that November opens well for the Anthracite trade. Complaints of dullness are seldom heard, although with the present liberal output they think there is little chance of prices hardening. The production is now over two and one-quarter millions of tons in excess of last year. A restriction in December is sometimes spoken of as positive, but we learn that nothing has been agreed upon as yet in this respect. With most of the companies prices are a little off, special Coals excepted. The Pennsylvania Coal Company report the demand quite active for manufacturing sizes, giving their working force full employment. In the general market there is not yet a complete recovery from the heavy low-price sales of about October 1. Bituminous Coal is unchanged at about \$4 @ \$4.25 alongside for Cumberland. Production is heavy.

The Pottsville Miners' Journal says: "The furnace sizes are dull, and will remain so until there is an improvement in the Pig-Iron trade, of which there is no immediate prospect." The total amount of Anthracite Coal sent to market for the week ending October 27, as reported by the several carrying companies, was 756,354 tons, compared with 66,597 tons in the corresponding week last year, an increase of 59,787 tons.

OLD METALS, PAPER STOCK, &c.

Purchasing prices offered by dealers are as follows:

	P. B.	Value
Copper, heavy.	\$0.12	66
" light.	.10	66
Copper Bottoms.	.10	66
Yellow Metal.	.0714	66
Brass, heavy.	.09	66
" light.	.07	66
Composition, heavy.	.11	66
" lead.	.0936	66
Tea Lead.	.0934	66
Zinc.	.08	66
Pewter, No. 1.	.14	66
" No. 2.	.10	66
Seconds.	.12	66
Soft Woollens.	.512	66
Mixed Rags.	.16	66
Gumby Bagging.	.16	66
Wooly Cutters.	.14	66
Kentucky Bagging.	.14	66
Book Stock.	.14	66
Newspaper.	.14	66
Waste Paper and Scraps.	.14	66
Kentucky Bale Rope.	.14	66

PHILADELPHIA.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, November 6, 1883.

Pig Iron.—There is not much change to notice, although the market is gradually assuming a more settled condition, and prices becoming more uniform and definite. This is due not so much to any general increase in the demand, but to the absorption of most of the low-priced lots by Pipe founders, and in endeavors by the same parties to make still further engagements for forward delivery. Hence anything of fair quality at less than \$18, delivered, for Gray Forge or Plain No. 2, is now quite exceptional, and that may be considered a rock-bottom quotation. Foundry Irons, on the other hand, have been marked down a trifle, so that it is not unlikely that the water has been pretty well squeezed out of the entire market. This feeling seems to have gained ground within the past 10 or 15 days, and while consumers show no anxiety in regard to the future, there is a general impression that the next turn in the market will be in sellers' favor. The dullness in Finished Iron and the general inactivity in business tend to repress speculation, however, and it may be some time yet before the position can be fully developed.

Old Rais.—There are more business doing and prices are somewhat firmer. A 100-ton lot of 4 inch Old T's was sold to-day at \$24, although ordinary Rais are still offered at \$24.50 as the ruling price for American T's, while mixed lots, it is said, can be had for \$23.50.

Scrap Iron.—Market very quiet, and price rather easier—say, \$23 for choice heavy, and \$16 @ \$18 for Cast.

The Cornwall Ore Bank Company have appointed Mr. Ethelbert Watts their sales agent, whose office will be at 220 South New ma., cse. 17 410

if any, below what it has averaged the past six months. On the whole, therefore, the market is probably in better shape than it has been for several months past, for the reasons already advanced, viz.: 1st, the absorption of all the low-priced lots; 2d, an active demand at same or a little better prices for forward deliveries; 3d, the marking down in quotations of Foundry Irons to solid figures; 4th, stocks on furnace banks held by strong parties, and, 5th, increasing evidence that the output is below rather than in excess of consumptive requirements. Sales during the week have been mostly in small lots, at prices varying from \$20.50 to \$22 for No. 1 Foundry Irons, \$19 @ \$20 for No. 2, and \$18 @ \$20 for Gray Forge, all delivered at tidewater. Large lots of the lower grades could have been placed, but sellers are somewhat firmer in their ideas of values, besides which stocks have been pretty well cleaned up.

Foreign Iron.—The market is very quiet, with no inquiries likely to lead to immediate business, although, in view of the recent heavy transactions in Steel Rails, sellers are rather more hopeful of something being done. Bessemer is offered for shipment at \$20.50, and 20 % Spiegelstein at \$30.50, with a possibility that bids at slightly lower figures might be accepted.

Muck Bars.—The market is very dull, and sellers are prepared to shade prices at least 50¢ @ ton, as compared with last week's quotations. Sales at \$33 @ \$33.50 at mill, with only a moderate demand.

Bloom.—Market extremely dull, and only small lots taken at about the following quotations: Charcoal Blooms, \$55 @ \$57; Run-out Anthracite, \$47.50; Scrap Blooms, \$42 @ \$43; Northern Ore Blooms, \$39.50 @ \$41.50.

Bar Iron.—Business is extremely dull, and gives not the slightest indication of early improvement. Prices have been cut down to the lowest point, but there is no increase in demand whatever; all the mills are running from a third to a half below their full capacity, and, even then, find it somewhat difficult to secure orders. There is nothing in the outlook to denote any material change in the position, and it is probable that for the balance of the year business will remain much as it has been during the past six months. There are somewhat sanguine anticipations of a better demand after the holidays; otherwise, suspension of work at the mills will be of longer duration than usual. Quotations for Refined Bars remain at 2.1¢ @ 2.4¢, although a good deal of Iron is selling at less money, quality probably

class of Iron here, and those who handle it are not inclined to import more before next spring. What there is on hand is held firm, as follows: Coltness, \$29; Summerlee, \$28, and Glengrnoch, \$28; these prices are for cash, and, it is said, cannot be discounted.

Merchant Steel.—The demand for Steel continues about as it has been for the past month. In the higher grades of Steel there is no probability of lower prices, as we are informed that it cannot be made for less money without sacrificing quality, which manufacturers are unwilling to do on established brands. In the lower grades or less established brands prices are very irregular, and competition so great that sales are almost without profit. The demand has improved some during the week, but the change is scarcely worth mentioning. We continue our former quotations for the best grades of Established Steel, as follows: Refined Cast Steel, 10½¢ @ 11½¢ per lb.; Crucible Machinery, 6½¢ @ 7¢; Bessemer and Open hearth do., 4½¢ @ 5¢; Steel Boiler Plate, 6¢ @ 6½¢.

Old Rails.—The Old Rail market has become firmer during the week, and stock less plentiful. Rolling mills are paying from \$21 to \$22, Chicago or Milwaukee delivery, and thus far have been able to secure a sufficiency at these figures, which are a small advance on last week's quotations.

Car Wheels.—Manufacturers of Car Wheels report a particularly brisk business for immediate use. Orders are principally from Western roads and at fair prices.

Old Car Wheels.—The market seems well supplied with Old Wheels, many of which are taken in exchange for new ones by manufacturers. When sold for cash they are worth \$18.50 per ton of 2200 lb. as they foundry.

Bar Iron.—While some of the dealers are complaining of dullness in the Merchant Iron trade, there are no indications of it with others. Consumers are paying considerable attention to quality, and to this fact is attributed the quietness prevailing in certain establishments. Much Iron which has been sold for "new puddled" during the past three months has failed to stand the test, which gives a great advantage to what is really first-class Iron. In the latter class there is a brisk demand in small lots, which command \$2 @ \$2.10 rates from store, while larger orders and specifications are placed at concessions ranging from 10½ to 15¢ less. These figures are pretty firm, and very little disposition is shown to cut.

Builders' Iron.—There is not much doing in this class of Iron at present, compared with a month ago. The trade is not what would be termed dull, but the heaviest part of the season's business is past. There are numerous contracts under way which are keeping some of the foundries hard at work, and will likely remain so through the winter. Outside of these special things trade has fallen off in accordance with the advancement of the season. We continue to quote Tank, 2.7¢; Angles, 2.9¢; Beams, 3.6¢, and Channels, 3.6¢ @ 3.8¢.

Galvanized Iron.—The market remains in about the same condition as at our last report. There is something doing all the time in a small way, but scarcely enough to be called a medium demand. Prices remain unchanged. Juniata is quoted at 45 and 5¢ off, and Refined at 45 and 10¢ off, with the customary shading for desirable quantities.

Black Sheets.—There is very little to be said in favor of the Black Sheet market. The Stove-Pipe trade is the strongest line of consumption at this time and the lighter qualities are in fair request, with an average demand for other numbers. We quote 24 at \$3.50, Nos. 25 and 26 at \$3.65, and No. 27 at \$3.80. These prices are actually well sustained, but we hear of sales at much lower figures in carload lots.

Scrap Iron.—There seems to be an abundance of Scrap in the market just now. Furnaces are very choice in their selections, and are not using anything but the best grade of No. 1 Mill Scrap, for which they pay from \$18.50 to \$19 per ton, Chicago or Milwaukee delivery. The following prices are quoted as dealers' purchasing prices: No. 1 Wrought Scrap, 1½ net ton, \$17.50; Cast Scrap, 1½ ton, \$15; No. 1 Stove Plate Scrap, 1½ ton, \$10; Wrought Turnings, 1½ ton, \$9; Cast Iron Borings, \$6; Old Plows and Plow Steel, \$10; Malleable Scrap, \$5.

EVERETT & POST, 156 Lake street, Chicago, report to us as follows, under date of November 3, 1883: **Pig Iron.**—Owing to the unsettled condition of the New York Lead market, it is almost impossible to arrive at a correct quotation for Pig Lead in this market. During the first of the week there were sales of some 240 tons Common at \$3.85, Chicago, but latterly prices have ranged from \$3.77½ to \$3.82½, according to brand and delivery.

CHATTANOOGA.

Office of *The Iron Age*, Market and 8th Streets, CHATTANOOGA, Nov. 5, 1883.

The rains and decidedly cool weather of the past week have lived up some lines of trade perceptibly. Several furnaces depending on water transportation have been forced to bank up several times during the fall, as boats could not do business half the time. The streams are now well filled and will probably remain at good tide for the balance of the season. The cold nights are helping the woolen goods and clothing trades. Manufacturers in all other lines than Iron are running flush and making money.

Pig Iron.—There is nothing of interest to report. Trade drags along after the style that seems to have become chronic. The large producers have come to the conclusion that prices must not go lower. They will stop making Iron rather than make further concessions. We continue quotations, with the explanation that only small lots bring full figures, while larger ones get liberal shadings, as do old customers. We quote No. 1 Foundry, \$10 @ \$20; No. 2 Foundry, \$18 or \$19; Gray Forge, \$16 or \$19; White and Mottled, \$14 @ \$15; Car-wheel Metal, \$24 or \$26.

Ore.—We quote 50¢ Brown Hematite, 1½ ton, \$2 @ \$2.75; Red Fossil, \$2 @ \$2.25, delivered at furnace.

Miscellaneous Articles.—Old Rails are strong at \$21 @ \$22. Supplies are light. Scraps are not sought. Choice Wrought goes at full figures, though there is little demand, and holders are not pushing their stocks on the market. Wrought Scrap, \$18 @ \$22; Cast Scrap, \$11 @ \$14; Old Wheels, nominal, \$22.

Nails.—Are steady at \$2.75 for large bills; 10¢ @ 15¢ higher for small lots.

Merchant Iron.—Bar is rather dull at \$2 as an outside quotation for large bills. It is said agents of Pittsburgh, Wheeling and Southern Ohio mills are offering to lay down Refined Bars in assorted lots at \$1.90. We quote Bolts, \$3 @ \$3.20; Spikes, \$2.60; Splices, \$2.

Coal.—We quote Fancy Lump, \$3; Common, \$2.50; run of mine to manufacturers, \$1.50 at mills.

Coke.—We quote Furnace Coke, \$3 at point of consumption; Foundry, 10¢ @ 12¢ per bushel.

LOUISVILLE.

Geo. H. Hull & Co., Commission Merchants, report to us as follows, under date of Nov. 3, 1883: The general market continues about the same as our last quotations, except some sales of round lots, on which special concessions have been made. Our prices continue unchanged:

FOUNDRY IRON.	
No. 1 Hanging Rock Charcoal.....	\$23.50 @ \$24.50
No. 1 Southern Charcoal.....	21.50 @ \$22.00
No. 1 Hanging Rock Stonecoal and Coke.....	19.50 @ \$20.50
No. 1 Southern Stonecoal and Coke.....	19.50 @ \$20.00
No. 2 Southern Stonecoal and Coke.....	18.50 @ \$19.00
Open Silver Gray.....	17.50 @ \$18.00
Close Silver Gray.....	16.50 @ \$17.00

MILL IRONS.

No. 1 Charcoal.....	19.00 @ \$20.00
No. 1 Stonecoal and Coke, Neutral.....	17.00 @ \$17.50
No. 2 Stonecoal and Coke and Coke.....	16.50 @ \$17.00
No. 1 " " Cold-short.....	15.50 @ \$17.00
No. 2 " " ".....	16.00 @ \$16.50
White and Mottled, Cold-short and Neutral.....	15.00 @ \$15.50

CAR WHEEL IRONS.

Hanging Rock, Cold-blast.....	30.00 @ \$31.00
" Warm-blast.....	28.00 @ \$24.00
Alabama and Georgia, Warm and Cold-blast.....	27.00 @ \$28.00
Central Kentucky, Cold-blast.....	26.50 @ \$27.00

W. B. BELKNAP & CO., Iron and Steel Merchants, Nos. 115 to 121 West Main street, report to us as follows, under date of November 2, 1883: There has been no change in Bar Iron since last report. The demand is confined to such as is actually needed for consumption, and this does not seem to be very much. There seem to be more new Tires going on old than on new wagons. Prices on Nails are firm, and the mills report large sales and no stocks. The Exposition, which has advertised the city as it never was before, closes on the 10th inst.

ST. LOUIS.

HOFFER & CO., Pig Iron and Iron Ore Merchants, 214 Pipe street, report to us as follows, under date of Nov. 3, 1883: The condition of this market and prices remain about the same as last reported. Old Wheels are selling at \$17 @ \$18; Old Rails at \$21 @ \$22. Quotations are:

HOT BLAST CHARCOAL IRONS.

Missouri.....	\$19.50 @ \$20.50
Southern.....	20.00 @ \$22.00
Ohio.....	24.00 @ \$29.00

COAL AND COKE IRONS.

Missouri.....	19.50 @ \$20.50
Southern.....	18.50 @ \$19.50
Ohio.....	21.00 @ \$25.00

MILL IRONS.

Red-short.....	18.00 @ \$19.50
Neutral.....	17.00 @ \$18.00

CAR WHEEL AND MALLEABLE IRONS.

Missouri.....	19.50 @ \$21.00
Southern.....	23.00 @ \$29.00

*

BALTIMORE.

W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of Nov. 5, 1883: We have to report a quiet and unsettled market for the past week, with values ruling shaded, at annexed figures:

Ref. Bar Iron, 1 to 6 x ¾ to 1. ½ to 2 1-10 @ 2 2-10¢	
" 1 to 4½ to 1½ to 1. ½ to 2 1-10 @ 2 2-10¢	
and Square.....	½ to 2 1-10 @ 2 2-10¢
Hoop Iron, 1½ wide and upward.....	8 ½ to 3 1-10¢
Band Iron, from 1½ to 6 in. wide.....	25 ½ to 3 1-10¢
Hoop Iron, 1½ wide and upward.....	21-20 @ 3 3-10¢
Norway Nail Rods.....	54 ½ to 5½ @ 6¢
Black Diamond Cast Steel.....	11 ½ to 12 ½ @ 5¢
Machinery Steel.....	4 ½ to 4 ½ @ 5¢
Spring Steel.....	4 ½ to 4 ½ @ 4 ½¢
Common Horse Nails.....	10 ½ to 11 ½ @ 6¢
Railroad Spikes, 5½ x 9-10.....	2 ½-10 @ 2 2-10¢
Perkins' Horse Shoes, 1½ kg of 100 lb.....	\$1.37½
Mule Shoes.....	5.37½

Ancient and Modern Time-Keepers.

Indifferent time-keepers as were the "pocket clocks" of the Middle Ages, no one individual appears to have been responsible for the machine as a whole. Was it from an Italian or a German brain that the equivalent of our modern watch was first educated? The credit of the invention belongs to one or the other. Gaspar Visconti, an Italian poet, writing during the final decade of the fifteenth century, sings of "certain small and portable clocks made with a little ingenuity, which are constantly going, showing the hours, many courses of the planets, the festivals, and striking when the time requires it." That was nearly a hundred years before the melancholy Jacques, in Shakespeare's "As You Like It," "met a fool in the forest," the same fool that "drew a dial from his pocket, and, looking on it with lack-luster eyes, says very wisely, 'It is ten o'clock.'"
The Shakespearean commentators have even now not decided what kind of dial it was that the fool first and Jacques afterward moralized on. Mr. Halliwell conjectures that it may have been the "common ring dial" of the period. Another learned author surmises that the fool's time-keeper was probably similar to the elaborate octagonal silver pocket dial preserved in the collection of the Honorable Company of Clockmakers. It may, however, just as likely have been one of the Italian "small and portable clocks" mentioned by Visconti, or even one of the earlier regular watches of German manufacture.

Pig Iron.—There is nothing of interest to report. Trade drags along after the style that seems to have become chronic. The large producers have come to the conclusion that prices must not go lower. They will stop making Iron rather than make further concessions. We continue quotations, with the explanation that only small lots bring full figures, while larger ones get liberal shadings, as do old customers. We quote No. 1 Foundry, \$10 @ \$20; No. 2 Foundry, \$18 or \$19; Gray Forge, \$16 or \$19; White and Mottled, \$14 @ \$15; Car-wheel Metal, \$24 or \$26.

Forces.—We quote 50¢ Brown Hematite, 1½ ton, \$2 @ \$2.75; Red Fossil, \$2 @ \$2.25, delivered at furnace.

Gaspar Visconti's sonnet. Hele, at that time a young man, is described by a contemporary writer as the maker of works "which even the most learned mathematicians admire, for he fabricates small horologies of iron fitted with many wheels, which, whithersoever they are turned, and without any weight, both show and strike the hours, whether they be carried in the bosom or the pocket." Shakespeare may have known of, or even seen, one of the "Nuremberg living eggs," as they were called, or a French table-watch, with a bell on top for striking—possibly the "strike upon the bell" of Macbeth—or even an Italian watch of the earliest manufacture. Considering to what extent the poet was indebted to the Italian novelists, Bandello and Luigi da Porta, Visconti's sonnet may not have escaped him. Watches, both oval and round, the latter not at all unlike, in outward appearance, to the modern lever, were made in England when the author of "As You Like It" was at the height of his prosperity. Mary Queen of Scots, gave a watch to her maid of honor, Mary Setoun, fashioned in the shape of a skull, suggestive of the relationship between time and death. Watch cases used to be made in the shapes of books and boxes, and they finally took the form which they still retain—minus a slight difference in the design of the bow—at least 250 years since. The watch belonged to John Milton while the author of "Paradise Lost" was yet known to his friends as the beautiful student of Christ's College, Cambridge, and was, in the year 1874, bequeathed by Lady Fellowes to the British Museum. Either Edward Barlow or Daniel Clarke invented the repeater. Barlow claimed the merit of the invention, and tried to get a patent for it, but James II, at the instance of the Clockmakers' Company, decided in favor of Quarke. Thompson thought out the cylinder escapement, with horizontal wheel, during the reign of Dutch William, about which time Nicholas Faero, in connection with the Debaufres, Peter and Jacob, took out an English patent, but the Clockmakers' Company, jealous of foreign rivalry, prevented them from getting an extension of the privilege by pretending that one of their fellowship, Ignatius Huggeford, anticipated Faero, and so the House of Commons decided against him. Huggeford was an impostor. He had, it appears, applied jewels to watches, but only as a sham, intended to deceive. Volumes might be written on the history of escapements and balances. Yet none of the long series of the ingenious inventions which go to make up even a low-priced modern watch excites our wonder so much as the marvelously exact mechanical appliances which the manufacturer has called into being.

Malleable Iron Blocks.

Our readers have observed the recent departure in the tackle-block line—the making of malleable iron blocks under the various patents of Capt. Geo. A. Ford—which has been commenced by some Cleveland capitalists, incorporated as the Cleveland Block Company. This company was organized about a year ago, since which time they have been perfecting their arrangements for manufacturing a full line of tackle blocks, to compete in form and price not only with wrought-iron blocks, but more especially with wooden ones. To that end their regular line of goods is made to conform in shape to the smooth outline of the wooden block, while being at the same time more compact and handsome, and having two points in its favor on which the manufacturers lay emphasis—first, the width of score, which is equal to a wide mortise wooden block, allowing much freer play for the rope; second, the strength and simplicity of the roller bushing used in the patent blocks, a feature especially valuable in marine use, where they are subjected to a great strain. The snatch block, as shown in the cut, has a patent automatic clutch, very simple and efficient, while in the larger sizes an inside wrought-iron strap aids in giving great strength. The special style of hollow shells used in their wire-rope blocks allows of extra sized and very strong, thick flanged sheaves, while inside wrought-iron straps to aid in supporting the pin, as in the snatch blocks, afford great strength with little additional weight. The sheaves of all large purchase blocks are also, if desired, furnished without added cost, with a self-lubricator which, it is said, will last for months and is easily re-

tage in using this gas as a fuel, or in a place where fuel is as cheap as it is in Western Pennsylvania there could be no inducement to employ it. In connection with this, the absolute necessity of using gas as a fuel of the future cannot but be present. Our methods in the consumption of coal are wasteful in the extreme. The amount of the absolute heating power of the coal that is utilized at present bears but a very small proportion to that which should be secured, and as the necessity becomes more urgent that iron be produced cheaper, the economy of fuel and the improvement in the quality of the product growing out of the use of gas must force it upon the attention of iron manufacturers and compel the adoption of this fuel. The chief hindrance to-day to the rapid introduction of gas as a fuel in iron works are not only the additional cost of plant that would be required, and the royalties on the different forms of producers and furnaces introduced, but the additional expense that would be entailed by the charging to profit and loss of much of the puddling furnace plant already in use at these mills, and though this may for a while interfere with the adoption of gas, it is evident that in the near future gas must be a fuel, and the probability is that the use of natural gas in Pittsburgh will so convince consumers of the advantages of gas as to lead to the adoption of coal gas in places where the natural product cannot be obtained.

Cuba and American Trade.

Our trade relations with Cuba and Spain remain in the same unsatisfactory condition complained of for many years past, but there is some hope that remedial action will be taken in the next session of Congress. The trade of Cuba and adjacent islands under Spanish jurisdiction belongs to us, in large measure, by right of geographical position, but "more favored" nations, under existing treaties, derive therefrom the highest advantages. The United States Consul-General at Havana, who is now on a brief visit to this city, when speaking on this subject, said: "The trade relations between the United States and Cuba could not be worse. Owing to our nearness to the island, our merchants should have the monopoly of trade, but they are practically shut out, while Great Britain and Germany have everything. Our treaty with Spain does not give us the standing we should have. There is no 'most favored clause' in it, and, compared with Germany, France and England, we are at a great disadvantage. American flour is in great demand in Cuba, and is shipped to Spain, thence to Cuba, cheaper than it could be sent direct from New York. This is owing to the fact that heavy duties are imposed upon all American goods landed at Cuban ports. American merchants living in Cuba are still required to pay special war tax, levied to defray the expenses of the last insurrection, but in many individual cases I have interceded to prevent this imposition. Owing to Prince Bismarck, Germany comes under the clause of 'most favored nations,' and his countrymen escape this taxation. I cannot speak for British subjects, but I believe that some of their merchants are compelled to bear their share of the burden."

The large shipments of American flour to Cuba via Spain, as above noticed, is only one of many facts which indicate the abnormal state of our trade relation with Spain and her dependencies. It is stated by merchant of this city, formerly resident of Spain, that although France grows no cotton, she sold to Spain in the year 1881 nearly \$2,000,000 of the raw material, which was undoubtedly grown in the United States, but was first shipped to France—one of the more favored nations—thereby saving one-fifth of

Henry Disston & Sons,



KEYSTONE SAW, TOOL, STEEL & FILE WORKS,

Front and Laurel Streets,

PHILADELPHIA.

Branch Works: Branch House:

TACONY. CHICAGO.

SAWS, FILES & TOOLS,

for the Markets of the World.

Automatic Filing Machines, Cabinet Scrapers,

Cane Knives,

Center Gauges,

Corn Knives,

Currier Blades,

Fay Webs,

Files,

Futtock

Webs,

Gummer Cutters and Cutter Grinders,

Gummers,

Machinists' Steel Squares,

Rules, Levels, Straight Edges,

Mortise Gauges,

Molders' Tools,

Paper Knives,

Plumbs & Levels,

Pointing, Plastering and Brick Trowels,

Post Hole Diggers,

Saw Clamps,

Saw Sets,

Screw-Drivers,

Slate Knives,

Saw and Crout Cutters,

Squares and Bevels,

Wire Gauges,

The Manufactures of this firm have secured the highest Premiums at all the great World's Fairs, where they have been exhibited.

All Goods bearing our name are fully warranted.

GRIFFIN'S CELEBRATED HACK SAW.
The Best, the Cheapest, the Most Durable. It Exceeds all Others.
NO FILING REQUIRED. ALWAYS READY FOR USE.



12 Blades Extra with Each Frame.

A New Blade Furnished for Less Than the Cost of Filing an Old One. This Saw has been on the market but a short time, and there are 100,000 BLADES and 20,000 FRAMES already in use.

FROM AMONG OUR MANY TESTIMONIALS WE PRINT THE FOLLOWING:

Boston, April, 1881. J. K. Proctor (Foreman, Fairbanks, Bacon & Co., Scale Mfrs.)

Five Sizes of these saws are made, length of blades being 6, 8, 10 and 12 inches. One 8-inch Frame, with 12 extra blades, sent for inspection of the Trade on receipt of \$1.50, postage prepaid.

For Sale Generally by the Hardware Trade of the United States.

C. E. JENNINGS & CO., Sol's Agents, 96 Chambers St., NEW YORK.

EASTLAKE PATTERN.



THE HOLMES & EDWARDS SILVER COMPANY,
BRIDGEPORT, CONN.,

MANUFACTURERS OF

Finest Electro Silver Plated Table, Dessert, Tea, Coffee, Child's, Ice Cream, Berry, Egg, Bar, Mustard and Salt Spoons. Medium, Dessert, Salad, Chow Chow, Pie, Child's, Oyster and Pickle Forks. Sugar Shells, Tongs and Sifters. Preserves Shells. Medium, Dessert, Fish, Pie, Butter, Child's and Fruit Knives. Julep Strainers, Nut Picks, Combination Sets. Cream, Gravy, Oyster and Soup Ladles. Call Bells, all latest patterns, 18 per cent. Nickel Silver Base, Heavy, Medium and Light Plate. Also Nickel Silver, Heavy and Light, in various Patterns, Unplated. Likewise Brass Light Plated Lily Pattern, &c., &c.

We hereby guarantee that all Spoons, Forks, Knives, Ladles, &c., bearing our names and trade-mark are heavily plated with pure Sterling Silver, upon the fine base of silver, the best known base for plating upon; that the deposit is fully 20 per cent. heavier than the usual standard, having been accurately weighed upon the goods, and rigidly inspected with a view to their durability. We hereby authorize the purchaser, when our wares shall not prove exactly as represented, to return them to us, and we will remit their invoice value or replace them.

Send for Illustrated Catalogue, Price List and Discounts.

THE ALFORD & BERKELE CO., Special Agents, 77 Chambers St., N. Y.
P. O. Box 2002.

The Improved "Climax" Reversible Ice Creeper.

PATENTED APRIL 30, 1878.

CHILDS, GROFF & CO., Manufacturers,
CLEVELAND, OHIO.

Perfect Safety Secured in Walking on Ice or Slippery Pavements.



"A" represents the Creeper in position ready for use.
"B" shows the Creeper thrown back entirely out of the way when not in use, or walking in doors.

This Creeper has advantages over all others.

Its simplicity of construction, being easily adjusted, always ready for use, and when not needed can be instantly turned under the "Shank" out of the way, therefore not interfering with walking in the house on carpets, &c. When in position for walking on ice, it is a sure protection from falling.

Can be ordered at manufacturers' prices from

Hiddle Hardware Co., Philadelphia.

Henry Brooks & Co., Boston.
Peek & Snyder, New York.

A. FIELD & SONS,

MANUFACTURERS OF

WIRE NAILS

of Every Quality and Description.

Taunton, Mass., and 78 Chambers
Street, New York.

CLEVELAND BLOCK CO.,
Manufacturers of
MALLEABLE IRON
TACKLE BLOCKS.

No. 1 Carries 7 feet earth.

No. 2 Carries 5 feet earth.

No. 3 Carries 3 1/2 feet earth.

THE CUMMER ENGINE CO.

WERE AWARDED THE
GRAND GOLD MEDAL

for the BEST AUTOMATIC ENGINE, and a SPECIAL PRIZE of \$100 IN GOLD for EXTRAORDINARY MERIT, at the INDUSTRIAL EXPOSITION just closed at CINCINNATI, OHIO.

SEND FOR 150-PAGE CATALOGUE.

ADDRESS,

THE CUMMER ENGINE CO., Cleveland, Ohio.

THE

CHARLES PARKER CO.,

MERIDEN,
CONN.,

Manufacturers of

CABINET LOCKS.

J. STEVENS & CO.,

CHICOOPEE FALLS, MASS., P. O. Box 224,

MANUFACTURERS OF

SPRING CALIPERS AND DIVIDERS.

Also, Surface Gauges and Counter Sinks, Stevens' Patent breech-loading Sporting Rifles, double and single barrel; Shot Guns, Pocket Rifles, Pocket Pistols, and the noted Hunters' Pet Rifles. Our

SHOOTING GALLERY RIFLE

Is the Favorite Everywhere.

Send for Illustrated Catalogue and Discounts.

BOARDMAN'S PATENT COMBINATION WRENCH.

The Most Popular Combination Tool in the Trade.

Made in the most Thorough Manner, of the Best Material and Finish,

By JOHN J. TOWER,
96 Chambers Street,
NEW YORK.

CARY'S PATENT WARDROBE HOOKS,

DRAWER AND WINDOW KNOBS, SCREW KNOBS,

TOWEL RACKS, &c.

PATENTED.
March 26, 1878,
July 27, 1880.



SEND FOR
PRICE LIST.

MANUFACTURED ONLY
BY

VANDERBILT BROS.,

2 Lispenard Street, Cor.
W. Broadway, N. Y.



ACME ICE CREEPER.
Patented Oct. 16, 1888,
and Patent Pending.
SIMPLE, DURABLE,
CHEAP.

IN USE.

OUT OF USE.

L. A. SAYRE, Newark, N. J.

The Medart Patent Wrought Rim Pulley

THE LIGHTEST, STRONGEST, BEST BALANCED,
AND CHEAPEST IN THE WORLD.



Whole Pulleys, from 9 inches to 120 inches diameter. Split Pulleys, from 12 inches to 120 inches diameter. All widths of face up to 36 inches, crowning or straight, with single, double or triple sets of arms; also tight and loose pulleys.

Absolute Satisfaction Guaranteed.

SEND FOR PRICE LIST.

MEDART PAT. PULLEY CO., 1206 to 1214 St. Louis, Mo.

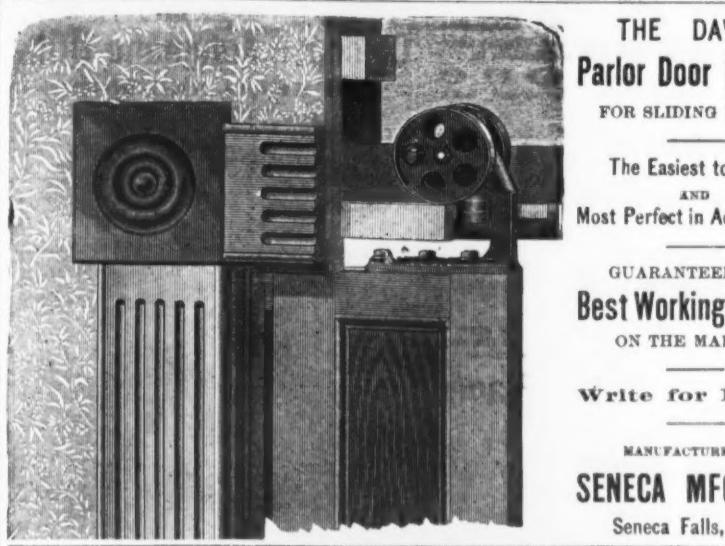
Railroad



STANDARD
SCALES
AND
TESTING
MACHINES

PHILADELPHIA,
50 South Fourth St.
NEW YORK,
115 Liberty Street.

Tests of Materials made daily at the Works, and certificates furnished. Reports copied and kept confidential.



THE DAVIS"
Parlor Door Hanger,
FOR SLIDING DOORS.

The Easiest to Hang
AND
Most Perfect in Adjustment.

GUARANTEED THE
Best Working Hanger
ON THE MARKET.

Write for Prices

MANUFACTURED BY
SENECA MFG. CO.,
Seneca Falls, N. Y.



PLENTY OF SOFT CORN,

BUT SWINE JEWELRY

will be wanted all the same. Send in your orders for the best

**HOG and PIG RINGERS
AND RINGS**
IN THE WORLD.

E. BLAIR, Mfr., Bucyrus, Ohio.

THE
Dangler Illuminating Torch.

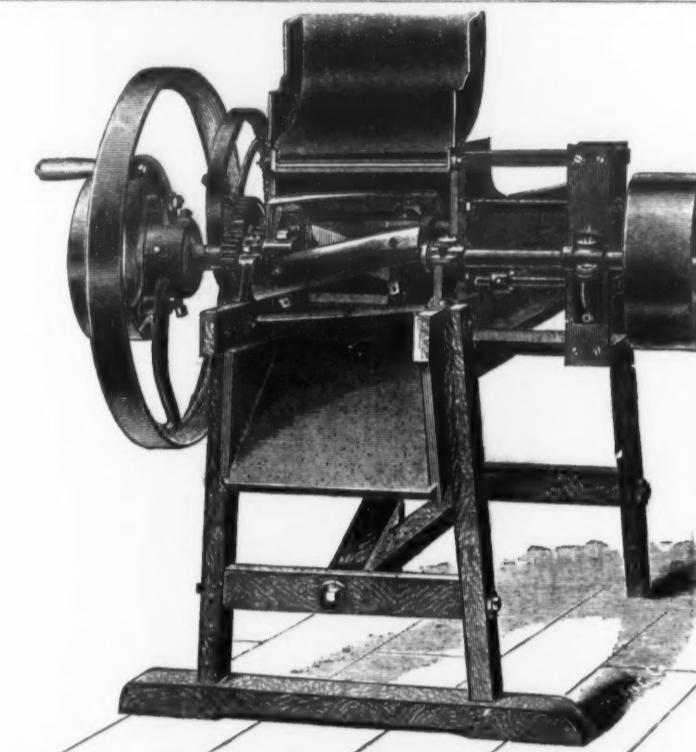
The Only Strictly Reliable Torch Made.



The lighting of large manufacturing establishments with convenient, portable, brilliant, steady light, and by cheaper means than coal gas or the unsteady electric light, has been successfully accomplished by us by vaporizing Oil, Naphtha and Gasoline into Gas or Vapor, and so made as to throw out 12 large gas jets, affording a brilliant light. Can furnish with Stand and Reflector when desired.

In addition to our own valuable patents, we have purchased all the Billings Patents, also the Wackerman Electric Torch, giving us the entire control of all that is valuable in Oil Vapor Burners in the United States, and hereby give notice that any attempt to infringe upon any of these patents will be prosecuted. For full particulars, address

The Dangler Vapor Stove & Rfg. Co.
CLEVELAND, OHIO,
Or, No. 311 State St., CHICAGO, ILL.



ROSS LITTLE GIANT N° 13.

ROSS ENSILAGE AND FODDER CUTTERS, Giants and Little Giants.

THE VERY BEST CUTTERS IN THE MARKET.

GUARANTEED TO GIVE PERFECT SATISFACTION.

Our 1883 Cutters are the finest we have ever produced. A liberal discount to the trade. Write for prices and illustrated circular.

E. W. ROSS & CO., Fulton, Oswego Co., N. Y.

Mention The Iron Age.



ANDREWS SPECIALITIES
ALL ARE PATENTED.

GALATOGUES
SENT ON APPLICATION.

MANUFACTURED BY
E. ANDREWS & SONS
WILLIAMSPORT, PA.

UNBREAKABLE
(CAST METAL)

Lamps & Oilers

NO BREAK, NO LEAK.

CAST IN ONE PIECE.

NO SEAMS.

Get New Discount.

PAINES, DIEHL & CO.,

IMPORTERS,

7 Strawberry St., Philadelphia, Pa.

200,000

Sold in Two Years.



IRON & BRASS GIMLET-POINTED WOOD SCREWS.

Quality, finish and tests as to strength guaranteed equal to any in the market.

With improved facilities and largely increased capacity for production, we can fill orders promptly, and invite inquiries for discounts. A full line in stock.

PHILADELPHIA SCREW CO., Limited,

Twelfth and Buttonwood Streets,

PHILADELPHIA.

TRADE MARK

CHAR. MARC. IRON SCREWS

W. 1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

The Iron Age Directory

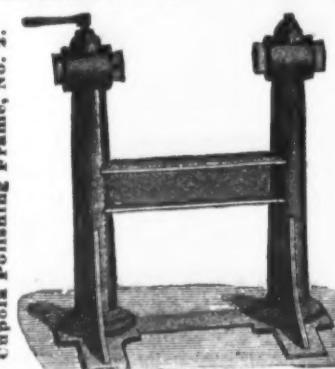
And Index to Advertisements.

	PAGE
Agricultural Implements.	9
Grant Farm Mill and Cradle Co., Melrose, N. Y.	18
Air Compressors.	10
Air Lyon Steam Pump Works, Brooklyn, N. Y.	42
Almond Rock Iron Works Co., S. Norwalk Conn.	42
Alarm Honey Drawers.	10
Almeda Alarm Till Co., East Syracuse, N. Y.	10
Tucker Alarm Till Co.	10
Anti-Friction Metals.	4
Devrees Paul S., Philadelphia	44
Artistic Manufacuturers of.	18
Bailey Herman & Co., 101 and 103 Duane, N. Y.	18
Belcher & Co., Detroit, Mich.	38
Finer & Sons, Trenton, N. J.	9
Arm & Ammunition.	20
The Alford & Berkely Co., 77 Chambers, N. Y.	20
Field Alfred & Co., 99 Chambers, N. Y.	10
Remington & Sons, 285 Broadway, N. Y.	36
Smith Oil Co., Rockland, Conn.	16
Stevens J. & Co., Chicopee Falls, Mass.	29
Artsian Well Supplies.	25
Loyd & Drake, for Readie, N. Y.	25
Asbestos.	34
The Asbestos Packing Co., Boston, Mass.	34
Atomizers.	11
Rowland, Thos. F., Brooklyn, N. Y.	11
Atlas Springs, &c., Manufacturers of.	42
Concord Axle Co., Fisherville (Concord), N. H.	42
Cook R. & Sons, Whinsted, Conn.	13
Gardner Steel Dpt. of Cambrion Iron Co., Johnsbury, Vt.	38-40
Liggett Spring and Axle Co., Pittsburgh, Pa.	44
Wurster F. W., Brooklyn, N. Y.	44
Axes.	44
Peck A. G. & Co., Cohoes, N. Y.	44
Banks.	25
P. W. Gauaudet & Co., a Wall, N. Y.	25
Barb Wire and Fence.	25
Hawk Elevated Barb Wire Co., Burlington, Iowa.	25
Hawthorne & Co., Dakar, Ill.	37
Iowa Barb Wire Co., Liberty, N. Y.	37
Midleton C. W. & H. W., Philadelphia Pa.	3
Wasbush & Moen Mfg. Co., Worcester, Mass.	3
Barb Wire Machinery.	37
Stover Mfg. Co., Freeport, Ill.	37
Bellows, Manufacturers of.	25
Flacons Wm. & Son, Pittsburgh, Pa.	25
Scott Geo. M., Chicago, Ill.	35
Bell Telephone.	41
Brown, S. & Co., Easthampton, Conn.	41
Belt Hooks.	41
Brown, S. & Co., 84 Chambers, N. Y.	2
Betting, Makers of.	2
Alexander Bros., 412 N. 3d, Philadelphia.	N. Y.
N. Y. Betting and Packing Co., 29 Park Row, N. Y.	13
Bicycles.	44
Ford Mfg. Co., 507 Washington, Boston.	44
Bird Cages, Makers of.	29
Lindeman O. & Co., 24 Pearl, N. Y.	3
Jewett John C. & Sons, Buffalo, N. Y.	18
McGill & Son, Buffalo, N. Y.	34
McKee W. H. & Bro., 114 South, N. Y.	44
Michigan Block Works, Detroit, Mich.	44
Pennell Block Co., Lockport, N. Y.	16
Bolt Cutters.	16
Hercules Powder Co., Cincinnati O.	29
Blocks, Tackie, Makers of.	41
Jackson & Loud, Boston, Mass.	41
Cleveland Block Co., Cleveland.	28
Moore & Son, New York, N. Y.	38
McKee W. H. & Bro., 114 South, N. Y.	44
Michigan Block Works, Detroit, Mich.	44
Pennell Block Co., Lockport, N. Y.	16
Bolt Feeders.	16
The Miller Co., Canton, O.	33
Bellers, How to Keep Clean.	12
Hotchkiss F. J. & John, N. Y.	12
Bellers, Steam.	12
Edge Mount Iron Company, 50 Liberty, N. Y.	17
Hartford Boiler Works, Philadelphia, Pa.	17
Love & Watson, Bridgeport, Conn.	37
McNeil James & Co., Pittsburgh, Pa.	29
Bolt and Rivet Clippers.	16
Chambers Brother & Co., Philadelphia, Pa.	16
Bolt Cutters.	16
National Machinery Co., Tiffin, O.	10
Sellers Wm. & Co., Phila., and 70 Liberty, N. Y.	10
Wiley & Russell Mfg. Co., Greenfield, Mass.	12
Bottles.	16
W. T. Comstock, 6 Astor Place, N. Y.	32
Boring Machines.	16
W. S. Wells Mfg. Co., A-haway, R. I.	38
Boxes for Hardware.	16
Green S. H., 12 Murray, N. Y.	39
Bracket Woods.	16
Uptegrove Wm. S. & Co., foot E. 10th st., N. Y.	16
Brass Manufacturers of.	25
Almon Bros. and Cooper Co., 19 Cliff, N. Y.	28
Bridgeport Brass Co., Bridgeport Conn.	2
Brown & Bros., 81 Chambers, N. Y.	2
Davel John & Sons, 10 John, N. Y.	2
Detroit Copper and Brass Rolling Mills, Detroit.	2
Holmes, Smith & Haydens, 49 Chambers, N. Y.	2
Plume & Atwood Mfg. Co., 18 Murray, N. Y.	2
Rome Iron Works, Rome, N. Y.	2
Scovitt Mfg. Co., 40 Broad, New Haven, Conn.	2
Watson Bros. and Sons, Brooklyn, N. Y.	2
Waterbury Mfg. Co., Waterbury, Conn.	3
Brazed Butt Hinges.	25
Tiebout W. J. & 16 and 18 Chambers, N. Y.	25
Brass Founders.	43
McFarland Wm., Trenton, N. J.	43
Reeves Paul S., Philadelphia.	44
Reynolds Martin, Brooklyn, E. D., N. Y.	42
Bridge Builders.	4
Moser Iron Bridge and Roof Co., 4 Day, N. Y.	4
Bronze Bearings.	16
Almon Iron Works, Cleveland, O.	16
Buckets, Tongs and Elevator.	16
Rowland T. F., Brooklyn, N. Y.	44
Baldwin's Hardware.	44
Clark Mfg. Co., Buffalo, N. Y.	33
Faynor Mfg. Co., Chicago, Ill.	18
Whipple Mfg. Co., Cleveland, O.	18
Scoville & Shoe Knives, Manufacturers of.	10
Wilson John, Sheffield, England.	10
Buttons and Buttons.	10
Phoenix Cast Co., Bushville, Ind.	10
Casters—Phoenix Cast Co., Indianapolis, Ind.	10
Vale Caster Co., New Haven, Ct.	39
Castings, Brass and Iron.	16
Whipple Mfg. Co., Cleveland, O.	13
Castings, Iron.	13
Bowler & Co., Cleveland, Ohio.	9
S. Cheney & Son, Mansfield, N. Y.	35
Devlin Thos. & Sons, Philadelphia.	7
Elliott Mfg. Co., Cleveland, O.	35
Haight & Clark, Albany, N. Y.	35
Hamer & Co., Branford, Conn.	10
North Brothers, Philadelphia, Pa.	25
Syracuse Maleable Iron Works, Syracuse, N. Y.	4
Syracuse Maleable Iron Works, Buffalo, N. Y.	4
United States Steel Co., Youngstown, O.	7
Castings.	16
Chest Steel Castings Co., 407 Library, Phila., Pa.	44
Eureka Cast Steel Co., Chester, Pa.	44
Flagge Stahl & Co., Philadelphia.	44
Jones J. G. & Co., Spuyten Duyvil, N. Y.	44
Mackintosh, Hemphill & Co., Pittsburgh, Pa.	12
Pittsburgh Steel Casting Co., Pittsburgh, Pa.	44
Chains, Manufacturers of.	5
Bradley & Co., 81 Richmond St., Phila., Pa.	5
Chains.	5
Haines R., Philadelphia.	5
Chemical & Amend, 50 Third Ave., N. Y.	37
Chase, Manufacturers of.	5
East Broad Millbury Mass.	5
Civil Engineer and Geologist.	30
Randolph B. S., Martinsburg, W. Va.	30
Clay Pigeons and Traps.	42
Dale's Pigeon Co., Cincinnati, O.	42
Clock springs, &c.	7
Dunbar Bros., Bristol, Conn.	7
Clothes Dryers.	7
Hill Dryer Co., Worcester, Mass.	10
Fardee A. & Co., 111 Broadway, N. Y.	36
Coal Hods.	16
Esterbrook Wm., Philadelphia, Pa.	32
Coat Yarn.	4
John C. & Sons, Buffalo, N. Y.	4
Copper & Zinc Mills.	16
Lane Brothers, Poughkeepsie, N. Y.	34
Enterprise Mfg. Co., Philadelphia.	34
Flake, Mfg. Co., Pittsburgh, Pa.	34
George & Calfee, Manufacturers of.	10
Hamm & Cal Hdw. & Tool Co., Springfield, Mass.	30-33
Stevens J. & Co., Chicopee Falls, Mass.	30
Coppering Presses.	16
Hotchkiss & Son, Copying Press Co., 50th Bway, N. Y.	32
Copper, Brown & Sons, Buffalo, N. Y.	2
New Haven Copper Co., 30 Pearl, N. Y.	2
Cooper, Cole & Co., Baltimore Md.	3
Crude.	16
Dudgeon & Son, New Haven, Conn.	16
Drillers.	16
Drummond & Son, New Haven, Conn.	16
Drums.	16
Emerson, George W., & W., Co., Philadelphia.	16
Enterprise Mfg. Co., 24 Pearl, N. Y.	25
Fardee A. & Co., 111 Broadway, N. Y.	34
Field Alfred & Co., 99 Chambers, N. Y.	10
Fire Axles.	5
Forsters, Manufacturers of.	10
Fox, E. & Co., 14 Cliff, N. Y.	16
Furnaces, Makers of.	10
Garrison Hardware, Makers of.	10
E. D. Clapp Mfg. Co., Auburn, N. Y.	8
Eberhard Mfg. Co., Cleveland, O.	35
Smith B. D. & Co., 100 Franklin, N. Y.	35
Castings—Spring Cart Co., Bushville, Ind.	10
Casters—Phoenix Cast Co., Indianapolis, Ind.	10
Vale Caster Co., New Haven, Ct.	39
Castings, Brass and Iron.	16
Whipple Mfg. Co., Cleveland, O.	13
Castings, Iron.	13
Bowler & Co., Cleveland, Ohio.	9
S. Cheney & Son, Mansfield, N. Y.	35
Devlin Thos. & Sons, Philadelphia.	7
Elliott Mfg. Co., Cleveland, O.	35
Haight & Clark, Albany, N. Y.	35
Hamer & Co., Branford, Conn.	10
North Brothers, Philadelphia, Pa.	25
Syracuse Maleable Iron Works, Syracuse, N. Y.	4
Syracuse Maleable Iron Works, Buffalo, N. Y.	4
United States Steel Co., Youngstown, O.	7
Castings.	16
Chest Steel Castings Co., 407 Library, Phila., Pa.	44
Eureka Cast Steel Co., Chester, Pa.	44
Flagge Stahl & Co., Philadelphia.	44
Jones J. G. & Co., Spuyten Duyvil, N. Y.	44
Mackintosh, Hemphill & Co., Pittsburgh, Pa.	12
Pittsburgh Steel Casting Co., Pittsburgh, Pa.	44
Chains, Manufacturers of.	5
Bradley & Co., 81 Richmond St., Phila., Pa.	5
Haines R., Philadelphia.	5
Chemical & Amend, 50 Third Ave., N. Y.	37
Chase, Manufacturers of.	5
East Broad Millbury Mass.	5
Civil Engineer and Geologist.	30
Randolph B. S., Martinsburg, W. Va.	30
Clay Pigeons and Traps.	42
Dale's Pigeon Co., Cincinnati, O.	42
Clock springs, &c.	7</

BEST CAST TRADE U.S.N. MARK TOOL STEEL

BROWN & CO.
PITTSBURGH, PA.

Cupola Polishing Frame, No. 2.



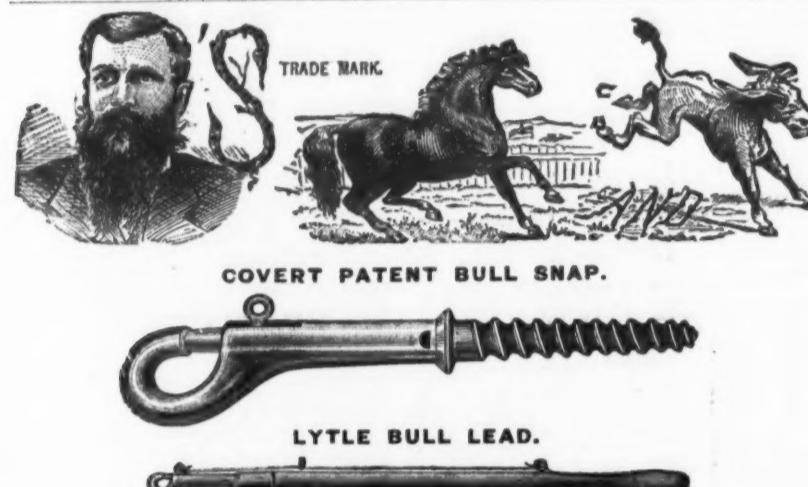
UNION STONE COMPANY.
38 & 40 Hawley Street, BOSTON, MASS.

Patentees and Manufacturers
OF THE

UNION EMERY WHEEL.

Emery Wheel Machinery and Tools a Specialty.
AUTOMATIC KNIFE GRINDING MACHINES.
Wood Polishing Wheels,
EMERY, QUARTZ, CORUNDUM
GRINDERS' AND POLISHERS' SUPPLIES.

CATALOGUE ON APPLICATION.



Covert's Celebrated Harness Snaps, Swivel Snaps, Open Eye Bit and Chain Snaps, Snap and Thimble for Horse and Cattle Ties. Rope Goods, consisting of Rope Halters, Horse and Cattle Ties, Halter Leads, Driving Reins, Weight Cords, Hitching Cords, Lariat Tethers and Picket Pins. Adjustable Soldering Irons.

— ALSO —

Leather Horse Ties, Breast Chains, Halter Chains, Martingale Chains, Rein Chains, Post Chains, Post Rods.

For sale by all Leading Jobbers in General and Saddlery Hardware, and the same discounts given from the list to the trade as when purchased direct from the factory.

For Illustrated Catalogue and Price List address

COVERT MANUFACTURING CO., Sole Manufacturers.
West Troy, N. Y.

USE THE HIGH STANDARD

PURE TURKISH EMERY,
MADE ONLY BY THE
WALPOLE EMERY MILLS,
South Walpole, Mass.



GEO. N. PIERCE & CO.,
BUFFALO, N. Y.,
New York Office, 195 Water Street.

Manufacturers of
BIRD CAGES and REFRIGERATORS.

Send for Illustrated Catalogue and Price Lists.

ALSO FOR SALE BY
Chicago Stamping Co., Chicago, Ill.
Sickles, Preston & Co., Davenport, Iowa.
Cincinnati Tin and Japan Co., Cincinnati, Ohio.
Kennedy, Spaulding & Co., Syracuse, N. Y.
Weaver & Goss, Rochester, N. Y.
E. A. Burrows & Co., Troy, N. Y.

An Anvil; A Vise, with Adjustable Jaw, and a Cutting-Off Tool.



For Descriptive Circulars and Trade Discounts, address CHENY ANVIL AND VISE CO. Detroit Mich.

WM ESTERBROOK
Wholesale Manufacturer of
Coal Hods,
311 Cherry St., PHILADELPHIA.

NEW AMERICAN FILE COMPANY.



NO EXTRA CHARGE MADE FOR THE TWO HANDLES
IN BOX WITH EACH DOZEN FILES.
[Order a Few for Trial.]

PAWTUCKET, R. I., U. S. A.

THE WESTINGHOUSE
AUTOMATIC
ENGINE.

30 to 300 Horse-Power.

Send for Illustrated Circular and Reference List.

STATE THE HORSE-POWER REQUIRED, AND

ASK OUR PRICES!

Especially adapted to Direct Connection to Shafting and Machinery.

THE WESTINGHOUSE MACHINE CO.
PITTSBURGH, PA.

Address, if more 94 Liberty St., NEW YORK,
convenient, our 14 South Canal St., CHICAGO,
40 Elm St., DALLAS, TEXAS.

Flamming Injector Co.



Manufacturers of
THE ONLY GRADED INJECTOR ON THE
MARKET, AND PERFECTLY RELIABLE.

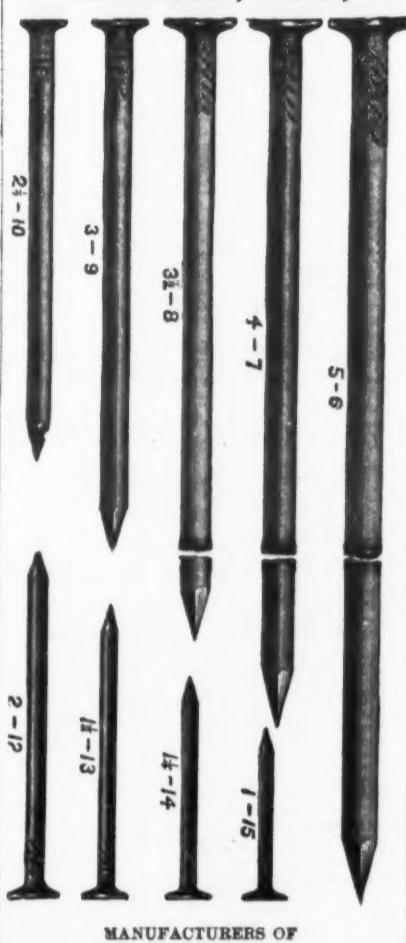
Send for Catalogue to
44 Atwater Block, CLEVELAND, OHIO.

NEW LETTER PRESS.—No Extra Tab!



THE U. S. PNEUMATIC COPYING PRESS CO.,
New York Office, 628 Broadway.
Factory, New Haven, Conn.

THE HP NAIL CO.,
CLEVELAND, OHIO.



MANUFACTURERS OF
WIRE NAILS

OF ALL KINDS.

Barbed or Plain Steel, Iron and Brass Nails, Cast Steel Wire Brads, Cast Steel Wire Finishing Nails, Cigar Box Nails, Escutcheon Pins, Wagon Nails, Clinch Nails, Hinge Nails, Wire Spikes for Track, Bridge and Dock Work, Tinned Nails, Galvanized Nails.

**NEW
PORTABLE OIL TORCH.**



Gives a clear white light, equal to half a dozen gas jets, from common Coal Oil. Burns without a wick; vaporizes the Oil in the coldest weather; costs less than a penny an hour to operate; is of simple construction; few parts; not liable to clog, and easily cleaned. Owing to the great force with which this Torch burns, it produces a better oxygenation of the flame, and will burn under conditions without smoke where the ordinary wall torch will not. It is convenient and indispensable in the numerous instances where it is desirable to have a light close to work, as in Car and Machine Shops, Round Houses, Mills, &c. We make these Torches in several sizes. Our Wall Torch is the best in the market.

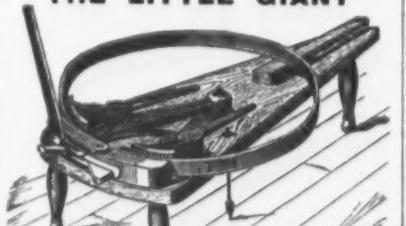
For full information, prices and discounts, address

THE STANDARD LIGHTING CO.

MAIN OFFICE:

122 WATER STREET,
CLEVELAND, OHIO.

THE LITTLE GIANT



Wagon Tire Upsetter.
The Cheapest and Best.
LITTLE GIANT MFG. CO.,
Milport, N. Y.

JOHN T. LEWIS & BROS.,
No. 231 South Front St.,
PHILADELPHIA.



TRADE MARK.
MANUFACTURERS OF
Pure White Lead, Red Lead, Litharge,
Orange Mineral, Linseed Oil,
AND PAINTERS' COLORS.

JOHN JEWETT & SONS
Manufacturers of the well-known brand of
WHITE LEAD.



TRADE MARK.
ALSO MANUFACTURERS OF
LINSEED OIL.
181 Front Street, NEW YORK.



The Atlantic White Lead and
Linseed Oil Co.,
Manufacturers of
White Lead (Atlantic), Red Lead, Litharge,
Glass Makers' Litharge and
Orange Mineral;

LINSEED OIL,
Raw, Refined and Boiled.

ROBERT COLGATE & CO.,
287 Pearl St., NEW YORK.

SALEM LEAD COMPANY,
CORRODERS AND MANUFACTURERS OF
PURE WHITE LEAD.



ALSO MANUFACTURERS OF
Lead Pipe and Narrow Sheet Lead.
SALEM, MASS.

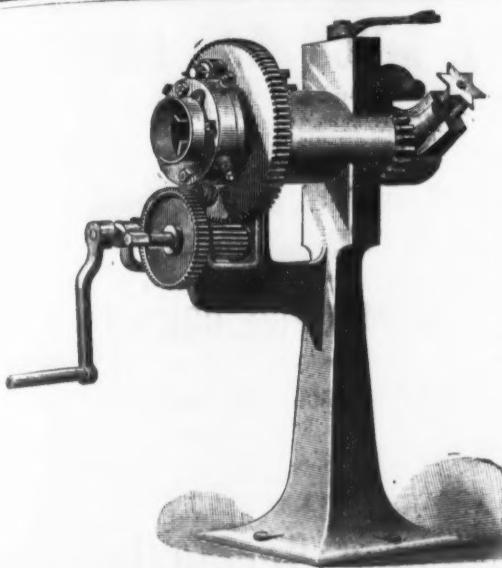
F. A. BROWN, Treas.

NEW INVENTION.

The cost of street lighting reduced one-half. The finest apparatus in the world for lighting private grounds. The Automatic Self-Extinguishing Lamp, using kerosene oil. It is the only lamp in the market that automatically extinguishes.

THE WICK DOES NOT BURN DRY.
Street lighting reduced to one trip a day. The New Patent Self-Measuring Can for Street Lighters' use. The Common Sense Street Lantern, for gas or oil. The New Pattern Lamp-post, adapted to both oil and gas, made entirely of wrought iron and sold for less than one-half the ordinary price of cast-iron posts. Send for circular and price list. Discount to the trade.

W. SCOTT & CO., Sole Manuf'rs.
OFFICE:
304 NOBLE ST., Bridgeport, Conn.



THE
ECLIPSE
Hand Pipe-Cutting
Machine

will be found a very convenient and efficient substitute for the heavy and costly Power Machines usually employed to cut and SCREW Wrought Iron Steam, Gas and Water Pipes.

While it is substantially built, and designed to work easily and without strain on any of its parts, it is at the same time very compact and portable.

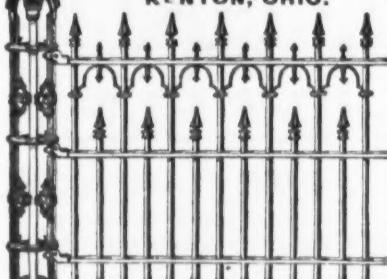
WE BUILD THREE SIZES:

No. 1. Cuts and Screws $\frac{1}{4}$ to $\frac{1}{2}$ inches.

No. 2. Cuts and Screws $\frac{1}{2}$ to $\frac{3}{4}$ inches.

No. 3. Cuts and Screws $\frac{3}{4}$ to 6 inches.

CHAMPION
IRON FENCE CO.,
KENTON, OHIO.



GREATEST
VARIETY OF
CAST AND MALLEABLE
IRON CRESTING

in the United States. Send for 120 page Catalogue. Also manufacturers of the BEST variety and styles

IRON LIFT AND FORCE PUMPS

Have a few pumps that are said to be BEST IN THE MARKET. Let no one wishing to handle iron pump fail to send for pump circular and prices.

RUBBER SQUEGEES
OR
FLOOR SCRUBBERS.



PRICE LIST.

No.	1	2	3	4	5	6
Size.	8	10	12	14	16	18 inches

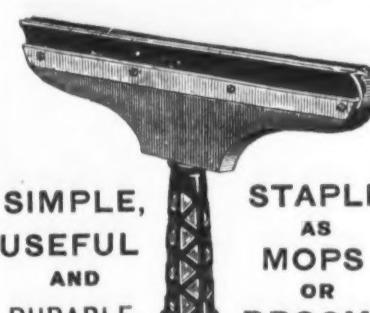
PURE RUBBER.

Price, \$5 \$6 \$7.50 \$9 \$10.50 \$12 per doz.

RUBBER PACKING.

Price, \$3.50 \$4.50 \$5.50 \$7 \$8 \$9 per doz.

PERFECTION WINDOW CLEANER.



SIMPLE,
USEFUL
AND
DURABLE.
STAPLE
AS
MOPS
OR
BROOMS

No.	1	2	3	4	5	6
Size.	7	9	10	12	14	18 inches

Price. \$3.60 \$4.20 \$4.80 \$5.40 \$6.00 \$9.00 doz.

Beware of Infringements.

Discounts on Application.

**PERFECTION WINDOW CLEANER CO.,
MANUFACTURERS,**

232 La Salle Street, - - CHICAGO, ILL., U. S. A.

THE

**WARREN
HOE.**

The pioneer among modern Patent Hoes. In its wake followed a succession of "notions," of peculiar shapes and construction, which have had their brief day and been cast aside.

THE WARREN

still holds its place as a Meritorious Hoe for general use, and a superior one to the common for some soil and some work.

Latterly it has had no especial push, but its merits in shape, and the excellent material and workmanship used, have given it an abiding place in the market.

It is especially well adapted to Potato Digging.

MADE ONLY BY

**WITTINGTON & COOLEY MFG. CO.,
JACKSON, MICH.**

FOR SALE BY THEIR AGENTS AND CUSTOMERS.

MELLERT FOUNDRY & MACHINE CO., LIMITED.



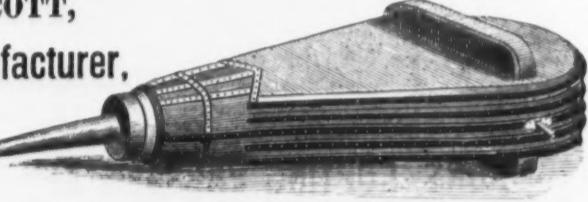
Also Flange Pipe, for Steam or Water, of all sizes used. Special Castings, such as Branches, Bonds, Reducers, Sleeves, &c. Stop Valves, Fire Hydrants, Etcetera, Lamp Posts, &c.

The Improved Canada Turbine Water Wheel. MACHINERY AND CASTINGS FOR FURNACES, ROLLING MILLS, MINING PUMPS, HOISTS, &c. CAR CASTINGS, GIRDERs, COLUMNS, BRACKETS, IRON RAILING, &c., &c. GENERAL OFFICE AT READING, PA.

GEO. M. SCOTT,

Bellows Manufacturer,

Johnson Street,
Cor. 22d St.,
CHICAGO, ILL.



CLARK MFG. CO. MANUFACTURERS OF BUILDERS' HARDWARE BUFFALO, N.Y.

THE COLT DISC ENGINE.

The Best and most Economical High Speed Engine made.

WILL OUTWEAR ALL OTHERS.

SPECIALLY SUITABLE FOR DYNAMO ELECTRIC MACHINES.

A MOST RELIABLE

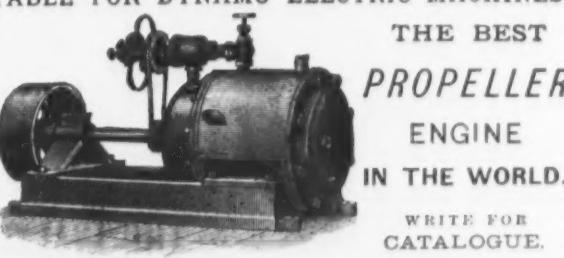
ELEVATOR

AND

Hoisting Engine

No Dead Centre, and will Start in any Position.

WRITE FOR TESTIMONIALS.



THE BEST
PROPELLER
ENGINE
IN THE WORLD.

COLT'S PAT. FIRE ARMS CO., Hartford, Conn.

or LEONARD & McCLOY, 118 Liberty St., New York.

IRON ROOFING.

Extra quality. Test plant in use. Sold as low as any other

MANUFACTURED BY

T. C. NYDNER & CO., Canton, Ohio.

Cheap, strong and durable. Does not get out of repair.

Every roof sold in even years satisfactory. Any mechanic can apply it. Circular and sample free.

Also manufacturers of the best and cheapest Metallic Paint in use.

Address

PANCOAST & MAULE,
243 and 245 South Third St., Philadelphia, Pa.



THE STANLEY WORKS,

MANUFACTURERS OF

**Wrought Iron Butts, Hinges
AND
DOOR BOLTS,**

Plain, Japanned, Bronzed and Plated.

FACTORIES:

New Britain, Connecticut.

WAREHOUSE:

79 Chambers St., New York.

Bemis & Call Hardware & Tool Co.



PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a combination which has no equal.

For Circulars and Price List, address

BEMIS & CALL HARDWARE & TOOL COMPANY, Springfield, Mass.



PRENTISS' PAT. VISSES,

Adjustable Jaw.

Stationary or Pat. Swivel Bottoms.

ADAPTED TO ALL KINDS OF VISE WORK. ALSO

"PEERLESS" SWIVEL PIPE GRIP,

FITS ANY VISE. SOLD BY THE TRADE.

PRENTISS VISE CO.,

28 Dey Street, New York.

SOLE PROPRIETORS. SEND FOR CIRCULAR.

**CHAMPION
HOG RINGER
RINGS AND HOLDER.**

Only double ring ever invented. The only ring that will effectually keep hogs from rooting. No sharp points in the nose.

Rings 75c. Rings, 100. Holders, 75c. Huskers, 150.

CHAMBERS, BEMING & QUINLAN, Exclusive Manufacturers, Decatur, Ill.



**EAGLE BILL
CORN HUSKER**

is the best Husker in the market. Farmers say it is the best. Use no other.

SOLE PROPRIETORS. SEND FOR CIRCULAR.

**BROWN'S
HOG AND PIC
RINGER AND RINGS.**

Only single ring ever invented. The only ring that will effectually keep hogs from rooting. No sharp points in the nose.

SOFT SURFACE.

GRINDSTONES
Of All Kinds.

127 Superior Street,

CLEVELAND, OHIO.

WORTHINGTON & SONS,

MANUFACTURERS OF

GRINDSTONES,

ALSO

SCYTHE STONES
OF ALL SHAPES.

BEST CRIT KNOWN.

Finest Put Up Goods in the Market.

Cor. Front and River Sts., CLEVELAND, OHIO.

CHAMBERS, BEMING & QUINLAN, Exclusive Manufacturers, Decatur, Ill.



Issues Policies of Insurance after a careful Inspection of the Boilers

COVERING ALL LOSS OR DAMAGE TO

Boilers, Buildings and Machinery,

ARISING FROM

STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of Steam Boilers.

Full information concerning the plan of the Company's operations can be obtained at the

COMPANY'S OFFICE, HARTFORD, CONN.,

or at any agency.

J. M. ALLEN, Pres. W. B. FRANKLIN, Vice-Pres. J. B. Pierce, Sec.

Board of Directors.

J. M. ALLEN President.
LUCAS C. DEER, President Alina Fire Ins. Co.
FRANK W. CHENEY, of Cheney Bros. Silk Mfrs.,
Hartford and New York.
CHARLES M. BEACH, of Beach & Company.
DANIEL PHILLIPS, of Adams' Express Company.
GEORGE A. FISHER, of NEW, President Holyoke Water
Power Company.
RICHARD W. H. JARVIS, President Colt's Pat. Fire
Arms Manufacturing Co.
THOMAS O. ENDERS, of the Alina Life Insurance Co.,
LEVERETT BRAINARD, of the Case, Lockwood &
HON. HENRY C. ROBINSON, Attorney at Law, Hart-
Brainard Co.

THE LARGEST FACING MILLS IN THE WORLD.
Capacity, 650 Barrels Per Day.

S. OBERMAYER & CO.,
Manufacturers of and Dealers in All Kinds of

Foundry Facings, Blackings, AND FOUNDRY SUPPLIES.

PLUMBAGO OR BLACK LEAD

For Lubricating, Electrotyping, Foundry and All Other Purposes.
ALSO SHIPPERS OF

THE CELEBRATED CINCINNATI MOLDING SANDS,

For Stove Plate, Heavy and Light Machinery, Agriculture and Brass Work.

Heavy Machinery and Fine Stove Plate Facings a Specialty.

AGENTS FOR MONK'S CELEBRATED MOLDERS' TOOLS.

SEND FOR ILLUSTRATED CATALOGUE AND PRICE LIST.

Office and Works, Cincinnati, Ohio, U. S. A.

ILLINOIS IRON & BOLT CO.,

Nos. 23 to 26 Main St., CARPENTERSVILLE, KANE CO., ILL.,

MANUFACTURERS OF

LOCOMOTIVE

Steel Wagon Steins.



AND WAGON

Blacksmiths' Tools.

SAD IRONS, COPYING PRESSES AND STANDS, &c.,
Ratchet, Tripod and Traveling Jack Screws.

POWER TRANSMITTING MACHINERY.

SHAFTING, HANGERS,
PULLEYS,
COUPLINGS,
CRANES
AND
MACHINE MOLDED
GEARS
A SPECIALTY.

THE WALKER MFG. CO.,
CLEVELAND, OHIO.

THE BILLINGS & SPENCER CO., Hartford, Ct.
THE BILLINGS PAT. POCKET WRENCH
And all descriptions of
DROP FORGINGS
for Guns, Pistols, Sewing Machines, and Machinery generally. Send for Catalogue.
A. C. BILLINGS, President, displayed at the New England Manufacturers' and Mechanics' Fair, Boston, Mass., Space No. 145.



B. KREISCHER & SONS, FIRE BRICK.

BEST AND CHEAPEST.

Established 1845.

Office, foot of Houston Street, East River,

NEW YORK.

NEWTON & CO.,
ALBANY, N. Y.

MANUFACTURERS OF BEST QUALITY

FIRE BRICK AND STOVE LININGS.

English, Scotch and Welsh

FIRE BRICKS, Dinas and Silton Bricks

for Glass and Steel Works.

S. A. RIMINGTON,
40 and 42 Broadway, New York.

Yard foot of 4th St., Hoboken, N. J.

M. D. VALENTINE & BRO.,

Manufacturers of

FIRE BRICK

And Furnace Blocks,

DRAIN PIPE AND LAND TILE,
Woodbridge. - - N. J.

BORGNER & O'BRIEN,

Manufacturers

FIRE BRICK

AND
Edge Pressed Furnace Blocks,

CLAY RETORTS, TILES, &c.,
Twenty-third Street,
Above Race, PHILADELPHIA.

Twenty years' practical Experience.

WATSON FIRE BRICK CO.,

ESTABLISHED 1856.

Successors to JOHN R. WATSON, Perth Amboy, New Jersey

Manufacturers of

FIRE BRICK,

FOR ROLLING MILLS, BLAST FURNACES, FOUDRIES, GAS WORKS, LIME KILNS, TANNORIES, BOILER AND GRATE SETTING, GLASS WORKS, &c.

Fire Clays, Fire Sand, and Kaolin for Sale.

HENRY MAURER,

Proprietor of the

Excelsior Fire Brick & Clay

Retort Works,

Manufacturers of FIRE BRICK, HOLLOW

BRICK AND CLAY RETORTS.

WORKS: PERTH AMBOY, NEW JERSEY

Office & Depot 418 to 422 East 23d St., N. Y.

TROY FIRE BRICK WORKS,

Troy, N. Y.

JAMES OSTRANDER & SON,

Established 1848. Manufacturers of

FIRE BRICK,

Tuyeres, Tiles, Blast Furnace Blocks, &c. Miners and

Dealers in Woodbridge Fire Clay and Sand, and Staten Island Kaolin.

Established 1864.

JAMES GARDNER,

Successor to GARDNER BROS.

MANUFACTURERS OF

STANDARD SAVAGE FIRE BRICK, TILE & FURNACE BLOCKS,

OF ALL SHAPES AND SIZES.

Miner and Shipper of "Mount Savage" Fire Clay

WORKS, Ellerslie, Alleghany Co., Md.

OFFICE, Room "C," Coal Exchange Building, Pittsburgh,

Pa. P. O. Box, No. 373.

S. M. Hamilton & Co., Agts., Baltimore, Md.

CHAS. D. COLSON,

DINAS, SCOTCH, SAVAGE, JERSEY, and other

FIRE BRICKS.

The Largest and Best Assorted Stock of Tiles

and Bricks, Fire Clay, Foundry Supplies, &c., in

the United States.

CHICAGO ILL.

UNION MINING COMPANY.

Mount Savage Fire Brick.

EDWARD J. ETTING Agent,

299 South Third St., Philadelphia, Pa.

PERTH AMBOY TERRA COTTA CO.,

Established 1846.

MANUFACTURERS OF

FIRE BRICK,

For Blast Furnaces and Rolling Mills.

Offices, 80 & 81 Astor House, New York.

EXCELSIOR AND

CLIPPER

LAWN MOWERS

GUARANTEED
BEST & CHEAPEST

LARGE REDUCTION
IN PRICE

10 to 20 IN.

HORSE MOWERS

25 to 40 IN.

CHADBORN &

COLDWELL

MANUF'D CO.

NEWBURGH, N. Y.

Send for Circular and Price-List.

W. A. RICE & CO.,

MANUFACTURERS' AGENTS,

HARDWARE and METALS,

SAN FRANCISCO, CAL.

Correspondence solicited with manufacturers desirous of being represented on the Pacific Coast.

Address,

E. W. Linforth, 102 Fulton St., New York.

WOODLAND FIRE BRICK CO., LIMITED,

Woodland, Clearfield Co., Pa.,

MANUFACTURERS OF

"WOODLAND" BRAND FOR STEEL FURNACES OF ALL KINDS, BLAST FURNACES AND

MALLEABLE IRON WORKS.

"BRADFORD" Brand for Rolling Mills, Glass Houses, &c.

"W. F. B." Brand for Hot Blast Stoves, Stacks, Cupolas, and all work requiring a cheap

grade of brick. Also, Fine Ground Clay to lay brick.

Western Office, 36 Sixth Street, Pittsburgh, Pa.

FIRE BRICK, CLIMAX FIRE BRICK CO.,

Successors to Red Bank Fire Brick Co.,

Blast Furnace and Steel Hole Brick

A SPECIALTY.

THOS. JOHNSTON, Agt., P. O. Box 976, Pittsburgh, Pa.

BOX'S PATENT

Double Screw Hoists.

The unbound reputation these Hoists have gained for themselves the last four years has no equal. There are now over 7000 in use. Large manufacturers have duplicated their orders a dozen times over. They are in use by all city departments, railroad companies, the United States Government, the English Government, the French Government, the Chinese Government, in India, Egypt, Chili, Brazil, Venezuela and Cuba. They have been awarded three silver medals and five diplomas. One trial will convince you they are the best in every particular. Sizes, 300 lbs. to 40,000.

Superior Hand and Power Traveling Cranes, from 1 to 40 tons.

Elevators for Heavy Work, 1 to 10 tons capacity.

Radial Drills of the Most Improved Kind.

Full Illustrated Circulars on application.

ALFRED BOX & CO.,

Northern Liberty Works,

312, 314 and 316 GREEN STREET,

PHILADELPHIA, PA.

SANDS' TRIPLE MOTION WHITE MOUNTAIN ICE CREAM FREEZERS.

THE WHITE MOUNTAIN FREEZER COMPANY are headquarters for Ice Cream Freezers and Ice Crushers, being the only firm in the United States who manufacture all parts of the raw material. The Examining Committee, consisting of 50,000 Citizens of the United States, have recommended the "Sands' Triple Motion White Mountain Freezer" to all persons: We have used them; they freeze quicker than any other; they save time, salt and ice; the triple motion makes smooth cream without bunches; makes more of it; galvanized iron outside; tin inside; no zinc in contact with the cream; easily adjusted; substantially made; simple in construction; perfect in results. Send for descriptive circular and discount



THE
CELEBRATED
**BUCKEYE
LANTERNS.**

BEST IN THE
MARKET.

Elegantly Made.
STRONG.

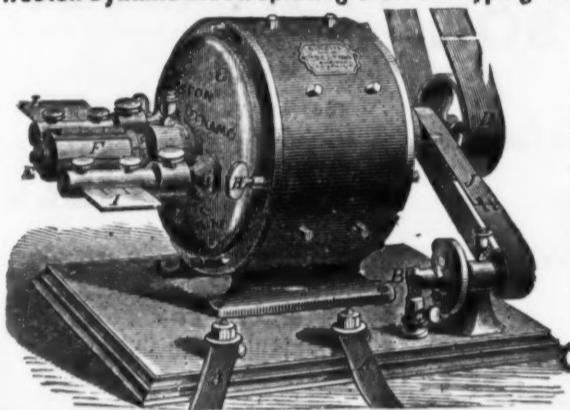
HIGHLY POLISHED.
Hinged Tops and Bottoms.
Removable Globes.

Will Stand any Draft
of Wind.

Free from Smoke.

Manufactured only by
Buckeye Lantern Co.
Bellaire, Ohio.
SEND FOR PRICES.

HANSON, VAN WINKLE & CO., Sole Agents for
Weston Dynamo Electroplating & Electrotyping Machines, Newark N. J.



For Nickel, Bronze Brass, Copper
and Silver Plating.
Over two machines in use.
Are used by all leading stove
manufacturers.

Experienced men sent to put
up machines and instruct pur-
chasers.

INFRINGEMENTS.
We call attention to infringements of the Weston Machine in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches and Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

MANUFACTURERS OF
Cast Nickel Anodes, Pur
Nickel Salts, Polishing
Materials.

Manufactory, Newark, N. J. New York Office, 92 & 94 Liberty St.

THE
EBERHARD MFG. CO.
CLEVELAND, OHIO.

Malleable Iron Carriage, Wagon and
Saddlery

HARDWARE.



Malleable Iron Castings also Made to
Order from Special Patterns.

Large variety in each line. New patterns, producing original designs, and goods better adapted to practical use than ever, offered to and through the hardware trade. Large stocks; prompt delivery. Send for catalogue and prices.

STEPHENS'
VISES.
Mechanics using these Vises save one-half their
time and labor.
For Sale by the Trade.

NATHAN STEPHENS,
Office, 41 Dey St., New York.



J. E. REDFIELD,
MANUFACTURER OF
TAPS, REAMERS, SCREW PLATES, &c.
ESSEX, CONN.

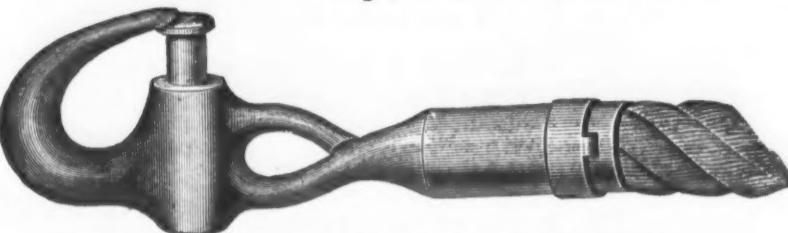
Our Taps are all Machine Relieved, and we guarantee them to give satisfaction.

S. CHENEY & SON,
MANLIUS, N. Y.
MANUFACTURERS OF LIGHT AND MEDIUM WEIGHT
GRAY IRON CASTINGS
METAL PATTERN MAKERS AND JAPANNERS.
Correspondence solicited.



THE UNION HARDWARE MFG. CO.,

West Troy, N. Y., U. S. A.,



Invite the attention of the Trade to their Superior

HORSE AND CATTLE FASTENINGS,

embracing a complete line of **Halters** and **Ties**, both in **Hemp** and **Jute**, made up with entirely new and original Patented Fixtures. The Snap used with these Fastenings is impervious to water and dirt (see cut), and is connected with the rope by a Clamp (the tensile grip of which is over 1400 pounds), which does away with the clumsy double splice heretofore in use (see cut). We also manufacture a full line of **Patent Improved Spiral Spring Snaps**, **Patent Improved German Snaps**, **Chain Goods, &c., &c.**

FOR SALE BY ALL LEADING JOBBERS, AT FACTORY PRICES.

Illustrated Catalogue and Price List Sent Free.

HORACE F. SISE, Agent, 100 Chambers Street, New York.
**NEW CHAMPION
FORCE PUMP.**

HAS
Vacuum Chamber and
Air Chamber,
PRODUCING
A CONTINUOUS FLOW
OF WATER,
Both in Suction and Discharge
AND THEREFORE
WORKS SMOOTHER
AND
EASIER
THAN ANY OTHER FORCE
PUMP IN THE MARKET.
HAS
Seamless Drawn Brass Cyl
inders and No Stuffing
Boxes.
Never Freezes in Winter, and is Not
Liable to Get Out of Order.

With hose attachment it is valuable as a fire protection, and for
sprinkling lawns, gardens, &c.
It is light, neat, and easy to
handle, and yet strong, substantial
and durable, and is adapted to
all kinds of wells, dug, drilled
or driven.
Send for descriptive circular
and price list.

CLARK BROS..
BELMONT, N. Y., U. S. A.,
SOLE MANUFACTURERS.

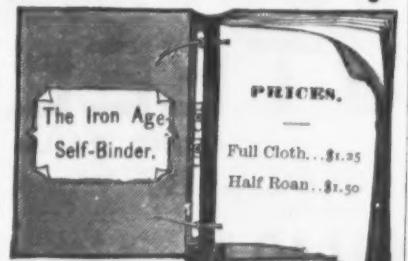
THE DESMOND INJECTOR



Has no Valves or other movable parts to get out of order. It can be entirely separated with a common monkey wrench. Is Easily Cleaned. It can be Operated by any Ordinary Engineer. Send for Descriptive Circular.

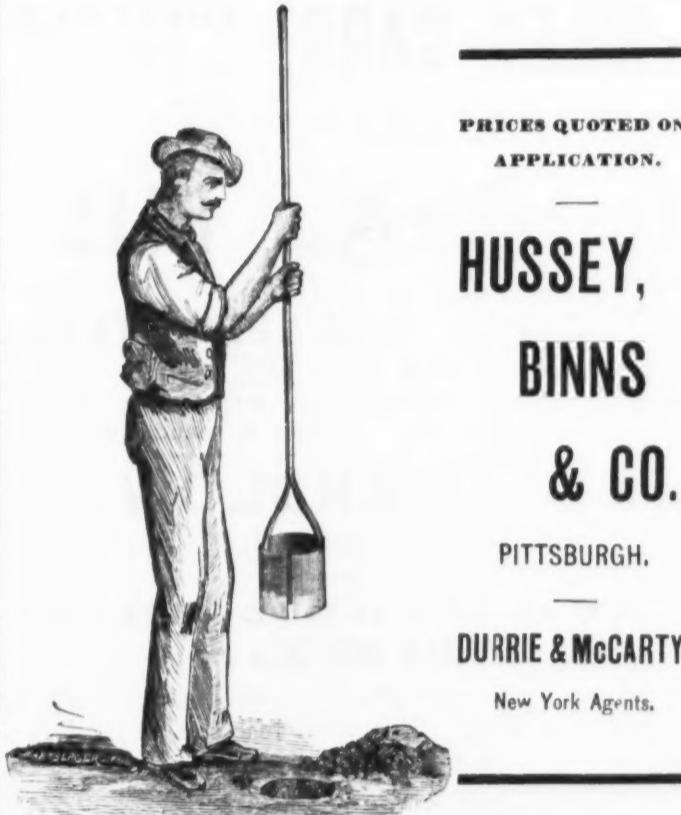
MANUFACTURED BY
THE DESMOND INJECTOR CO.,
JACKSON, MICH.

Self-Binders for The Iron Age



We are now prepared to supply our subscribers with an excellent self-binder for their papers, a cut of which is annexed. We call attention to the low prices at which it is offered. Address all orders to
DAVID WILLIAMS,
83 Reade Street, New York.

POST HOLE DIGGERS.



PRICES QUOTED ON
APPLICATION.

**HUSSEY,
BINNS
& CO.,**

PITTSBURGH.

DURRIE & McCARTY,
New York Agents.



TO THE TRADE.

GRAVITY SASH LOCKS.



The Best in the World.

Claim of Patent issued Sept. 4, 1883.

The improvement in Fasteners for the meeting rails of Window Sashes herein described, consisting of the base-plate provided with a rigid post, the sweep "C" journaled thereto and provided at its inner end with a pivoted latch, having a forwardly-extending arm which engages with a rigid notched or shouldered flange or plate, at the top of the post above the sweep, to lock the latter as detailed.

Having lately secured of the United States Patent Office the above claim, and as it does not in the least infringe the rights of the Morris Sash Lock Manufacturing Co., we shall hold the said parties responsible for all injury done our business by them, and shall protect our customers to the fullest extent against all claims of infringement by said Morris Sash Lock Manufacturing Co.

Try our Gravity Sash Locks, as they are the best in the world.

No Springs to Get Out of Order.

THE KEMPSHALL MFG. CO.,

September 17, 1883.

New Britain, Conn.

Merrill Brothers,
26 First Street,
BROOKLYN, N. Y.

DROP
HAMMERS,
FORGINGS and
POWER PRESSES.

R. H. WOLFF & CO.,
MANUFACTURERS OF
STEEL WIRE
FOR ALL PURPOSES.

Special Finest CAST STEEL WIRE.
Market Steel Wire, Prime Coppered Spring Wire, Tempered and Untempered Steel Wires, in Long Lengths, for Crinoline, Corset, Lock and Brush Makers, and all Special Purposes.

ALL KINDS OF FURNITURE SPRINGS.

IMPORTERS OF
IRON, STEEL, & RAILS of Every Description.

Wire Rods, Plain and Galvanized Wires, &c., Gun Barrels, Moulds, and Ordnance.

Shipments in bond from American Ports, and direct from Europe to all parts of the World.

EXPORTERS AND GENERAL MERCHANTS.

WORKS, PEEKSKILL, N. Y.

Agents of the ALLIS PATENT STEEL BARBED FENCE.



GALVANIZED TWISTED FENCE STRIP.

ADDRESS,
Office and Warehouse, 93 John Street, New York.

MILLER, METCALF & PARKIN,
Pittsburgh, Pa.,
Manufacturers of

CRESCENT STEEL,

In Bars, Sheets, Cold-Rolled Strips, &c.

Polished, Compressed Drill Rods and Wire.

Warranted equal to any imported in quality, finish and accuracy.

Also Common Grades.

J. & RILEY CARR,

Sole Importers and Manufacturers of the
Celebrated "Dog Brand"

STEEL
SHEFFIELD,
England.
ESTABLISHED 1810.

FILES.

BRIGHT COLD ROLLED STEEL,

PATENT WROUGHT IRON STEEL FACE ANVILS,

FARRIERS' KNIVES, HAMMERS, PINCERS, &c.

Warehouse: 30 Gold St., New York. HENRY W. BELCHER, Agent.

S. & C. WARDLOW,

Sheffield, England,
Manufacturers of the Celebrated

Cast and Double Shear
STEEL.

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table Knives, Mining Tools, Dies, Files, Clock and other Springs, and Tools of every variety.

Warehouse, 95 John Street, New York.

WILLIAM BROWN, Representative.

CLEVELAND ROLLING MILL CO.,
CLEVELAND, OHIO.
MANUFACTURERS OF

BESSEMER AND SIEMENS-MARTIN STEEL BLOOMS AND BILLETS,
BESSEMER STEEL RAILS, IRON RAILS & FASTENINGS.

Steel Street Rails, Wire, STEEL TIRE and FORGINGS, Iron and Steel Angles, Bar and Spring Steel, SOFT WELDING STEEL for Tools and Agricultural Work, CORRUGATED ROOFING and SIDING, IRON and STEEL BOILER PLATE, GALVANIZED and BLACK SHEET IRON, STANDARD CAST STEEL.

WESTERN AGENT, 91 Lake St., Chicago, NEW ENGLAND AGENT, 239 Franklin St., Boston, JOHN WALES & CO., Agents. N. D. PRATT, Agent. C. DICKERSON, Agent. NEW YORK AGENT, 100 Broadway, CINCINNATI AGENT, 181 Walnut St., CHARLES B. BELISH, Agent.

W. W. SCRANTON,
President.

WALTER SCRANTON,
Vice-President.

E. P. KINGSBURY,
Sec'y and Treas.

THE SCRANTON STEEL COMPANY,
MANUFACTURERS OF
STEEL RAILS & BILLETS.

Works at Scranton, Pa.

New York Office, - - - - - 56 Broadway.

THE MIDVALE STEEL CO.,
NICETOWN, PHILADELPHIA.

Best Warranted Cast Steel for Machinists' Tools, Taps, Dies, Punches, Shear Blades, Chipping Chisels and Granite Rock Drills, Extra Mild Center Steel, special for Taps;

ALSO,
MACHINERY AND CAST SPRING STEEL HEAVY AND LIGHT FORGINGS.
Warehouse, No. 12 North 5th St., Philadelphia.

Address A. M. F. Watson, General Sales Agent.

STEEL Gautier Steel.
See Page 3.

LABELLE STEEL WORKS.

SMITH, SUTTON & CO.,
MANUFACTURERS OF ALL KINDS OF

STEEL.

Also Springs, Axles, Rake Teeth, &c.

OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny.

Post Office Address, PITTSBURGH, PA.
Represented at Boston by WETHERELL BROS., 31 Oliver St.; at Philadelphia by JAMES C. HAND & CO., 614 and 616 Market St.; at Cleveland by CONDIT, WICK & CO., 153 Water St.

ALBANY & RENSSELAER IRON & STEEL CO.,
TROY, N. Y.,
MANUFACTURERS OF

BESSEMER STEEL RAILS,
FISH PLATES, BOLTS, NUTS, SPIKES, &c.

Machinery Steel, Merchant and Ship Iron.

CHESTER GRISWOLD, Vice-President, - 56 Broadway, New York City.

BOND, PARSONS & CO.,
104 John St., NEW YORK. 224 So. 3d St., PHILADELPHIA.

AMERICAN AND FOREIGN PIG IRON,

Spiegeleisen, Blooms, Rails, Wire Rods, &c.
TIN PLATES.

VIVIAN. YOUNGER & BOND, London & Birmingham.
FRANCIS HOBSON & SON,
97 John Street, NEW YORK.

Sole Manufact'r of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

CHAS. HUGILL, Agent.

ANDERSON, DU PUY & CO.,
(Successors to ANDERSON & CO.), Manufacturers of all Descriptions of

Tool,
Machinery,

STEEL. Agricultural,
&c.

Works and Office at Chartiers Station, P. & L. E. R. R. Branch Office, Cor. Ross & First Aves., PITTSBURGH, PA.

C. W. LEAVITT, New York Agent, 161 Broadway. M. T. MILES & SON, Western Agents, 170 Lake St., Chicago.

Heavy Iron and Steel Forgings,
MILLER FORCE AND IRON CO., Limited.

TEMPLE & LOCKWOOD,
12 Platt Street, New York.

Warranted Superior to any Steel in the Market, either English or American, for every purpose.

Also,

Combination Chrome Steel and Iron for Safes, Jails and Deposit Vaults.

Send for Circular
and
Price List.

Chrome Steel Works,

Kent Avenue and Keap Street,

BROOKLYN, E. D., N. Y.

Chicago Branch,

S. D. KIMBARK, Agent.

Cincinnati Branch,

N. E. cor. 5th & Main Streets.

CHROME CAST STEEL.

A general assortment of mine and narrow gauge rails kept on hand from which shipments can be made promptly.

W. E. C. COXE, President,
Reading, Pa.

S. W. INGERSOLL, Treasurer,
202 South Fourth St., Philadelphia, Pa.

PITTSBURGH BESSEMER STEEL CO.
(LIMITED).

STEEL RAILS
LIGHT RAILS A SPECIALTY.

P. O. Address, 87 Wood Street, Pittsburgh, Pa.

FOR STEEL CASTINGS.

We are licensing Steel Companies for the use of our Silica Molds for Steel Castings. Reference may be had to the Otis Iron and Steel Co., Cleveland, Ohio; Henr. Atch. & Co., Newark, N. J., and the Norway Steel and Iron Works, Boston, who are manufacturing under our patent. For particulars, terms, &c., address

COWING STEEL CASTING CO.,
CLEVELAND, OHIO.

R. MUSHET'S
Special Steel
FOR
LATHES, PLANERS, &c.

Turns out at least double work by increased speed and feed and cuts harder metals than any other Steel. Neither hardening nor tempering required.
Sole Makers,

SAMUEL OSBORN & CO.,
Sheffield, England.
Represented in the United States by

B. M. JONES & CO.,
Nos. 11 & 13 Oliver Street, BOSTON.

NAYLOR & CO.,
99 John St., New York. 6 Oliver St., Boston, Mass.
208 S. Fourth St., Philadelphia, Pa.

IMPORTERS OF
STEEL AND IRON RAILS.
Tin and Terne Plates,
Swedish and Norway Iron.

BESSEMER STEEL WIRE RODS.
Pig Iron, Spiegeleisen, Ferromanganese, Scrap Steel and Old Iron Rails.

MANUFACTURERS OF
STEEL COMPRESSED SHAFTING,
"Benzon" Homogeneous Plates
For Boilers, Fire-boxes, &c.

Axes, Crank Pins, Spring Steel,
And all other kinds of
Martin-Siemens Steel and Iron
For Railroad purposes.

F. W. MOSS,
CELEBRATED and OLD-ESTABLISHED BRANDS OF
"MOSS" and
"MOSS & GAMBLE'S"

STEEL AND FILES

Office and Warehouse:
80 JOHN ST., - - New York.

MACHINERY FOR
Straightening and Cutting Wire
Of all Sizes to any Length.
Send for Catalogue.
JOHN ADT,
New Haven, Conn., U. S. A.

A. PARDEE, Hazleton, Pa. J. G. FELL, Phila.

A. PARDEE & CO.,
237 South Third Street,
PHILADELPHIA,
No. 111 Broadway, New York.

MINERS AND SHIPPERS OF

Lehigh Coals.

The following superior and well-known Lehigh Coals are mined by ourselves and firms connected with us, viz.: HAZLETON, CRANBURY, SUGAR LOAF, LATTIMER.

A. Pardee & Co. Calvin Pardee & Co. HOLLYWOOD. Pardee, Sons & Co. MT. PLASANT.




GOLD MEDALS:

Paris, 1878. Melbourne, 1881.

WM. JESSOP & SONS,
Limited,
SHEFFIELD, ENGLAND.

STANDARD

TOOL STEEL OF THE WORLD.

NEW YORK WAREHOUSE:
91 JOHN STREET.

It Will Prevent Lameness.
The of all
Veterinary
SPECI
Full
all ord
THE
4
BAL
We h
for eight
ST
CH
ORES, I
Our Speci
ELEMEN

C. P. LELAND, Pres't. THE CLEVELAND CRUCIBLE STEEL CO., E. M. GRANT, Gen'l Mgr.
MANUFACTURERS OF
STEEL. FILE AND SPRING.
CLEVELAND, OHIO.
AGENTS:
BOSTON, Jas. J. KELLY, 28 Kilby Street.
NEW YORK, TEMPLE & LOCKWOOD, 12 Platt Street.
CINCINNATI, JOHN C. EBB & CO., 10 West 3d Street.

THOS. FIRTH & SONS, Limited,
SHEFFIELD,

Crucible Cast Steel.

JERE. ABBOTT & CO.,
AGENTS AND IMPORTERS OF
SWEDISH IRON,

35 Oliver St., BOSTON. 23 Cliff St., NEW YORK.

DODGE, HELLER & LYONS,
NEWARK, N. J.,
MANUFACTURERS OF

Clay Crucible Cast Steel.
Especially adapted for
TAPS, DIES, DRILLS, TURNING
TOOLS and other purposes where a Su-
perior and Even Quality of Steel is required.

ALSO MAKERS OF
Dodge's Patent Forging and Grinding Machines,
For SLEDGE and other HAMMERS, FILES, PLIERS and other irregular and tapering shapes.

GUSTAF LUNDBERG,
AGENT FOR

N. M. HÖGLUND'S SONS & CO.,
OF STOCKHOLM,

SWEDISH & NORWAY IRON,
38 KILBY STREET, BOSTON.

ALBERT POTTS, Philadelphia Agent, 234 & 236 N. Front Street.

MATTHIESSEN & HEGELER ZINC COMPANY,
LA SALLE, ILLINOIS,

MANUFACTURERS OF

**Refined Spelter, Sheet Zinc and
Sulphuric Acid.**

ALL ORDERS FILLED PROMPTLY.

THE LOCKIE HORSE SHOE PAD.



Patented June 1, 1880, and May 24, 1881.
The LOCKIE PAD has received the unanimous indorsement of all the leading Horsemen, Liverymen, Horseshoers and Veterinary Surgeons of Chicago and the Northwest.

SPECIAL DISCOUNT TO THE RETAIL HARDWARE TRADE.

Full directions furnished for putting on the Pads. Address all orders and communications to

THE LOCKIE HORSE SHOE PAD CO.,
44 NORTH CLARK ST., Chicago, III.

BARB WIRE MACHINERY.

We have made the Inventing and Manufacturing of this class of Machinery
A SPECIALTY

for eight years, and have the Largest and Best Facilities of any Manufactory in the country.

Will be pleased to give Estimates on receipt of Sample Barb.

STOVER MFG. CO.,
FREEPORT, ILL.

CHEMICALS AND APPARATUS
FOR THE ANALYSIS OF

ORES, IRON, STEEL, FUEL, FLUXES, FURNACE GASES, &c.,

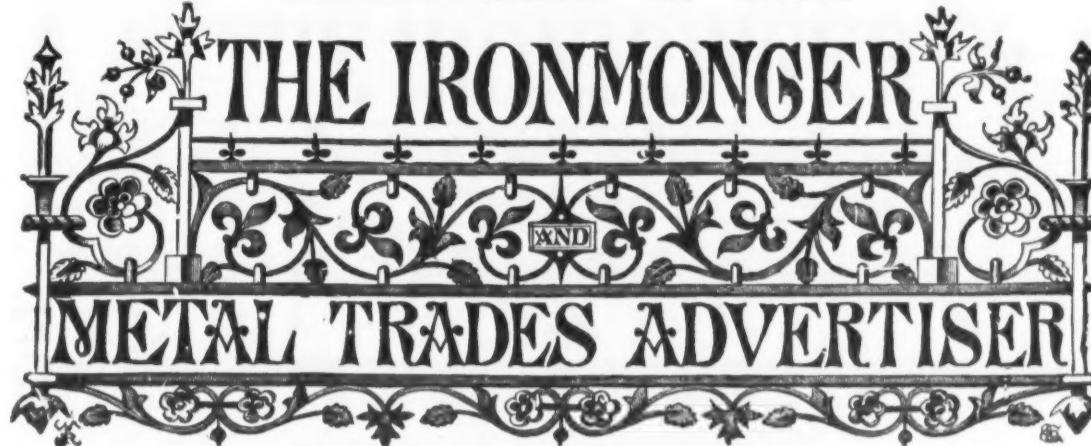
Our Specialty. Being direct Importers and Manufacturers we can offer superior inducements.

EIMER & AMEND, Nos. 205 to 211 Third Avenue.

NEW YORK. Eighteenth Street Station Elevated R. R.

Illustrated Catalogue Mailed on Application.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 42a CANNON STREET, LONDON, E. C.

ADVERTISEMENTS AND SUBSCRIPTIONS ARE RECEIVED AT THE VARIOUS OFFICES OF "THE IRON AGE," NAMELY:
NEW YORK OFFICE: DAVID WILLIAMS, Publisher of *The Iron Age*, 83 Reade street, who will, on receipt of application, supply specimen copies free.

PITTSBURGH OFFICE: Manager and Associate Editor. PHILADELPHIA OFFICE: Manager. SOUTHERN OFFICE: Manager. CHICAGO OFFICE: Manager.

Specimen copies free. The offices are located in the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*. *The Weekly Legal News, Trade Notes, Hawkings, Foreign Notes, Colonial Jottings, Merchants' Circulars, &c.*, are each departments of the journal containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

SPECIAL FEATURES.

Notes of Novelties. This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and importers are introducing to the notice of the trade. These articles are freely illustrated.

Special Correspondents. The *Ironmonger* has a well-earned reputation for its special correspondents, who are in the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*.

Notes, Colonial Jottings, Merchants' Circulars, &c. are each departments of the journal containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

SUBSCRIPTIONS

To the *Ironmonger and Metal Trades' Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-subscribers at 75 cents.

By a mutual clubbing arrangement between the two journals, subscriptions to both will be received by either *The Ironmonger* or *The Iron Age* on the following terms:

THE IRONMONGER and THE IRON AGE, Weekly. In the United States and Canada.....\$2.50 or £1.10s | In Great Britain and Ireland.....\$5.50 or £1.25s | In other countries.....\$8.00 or £1.12s

THE IRONMONGER, Weekly, and THE IRON AGE, Monthly. In the United States and Canada.....\$5.75 or £1.25s | In Great Britain and Ireland.....\$3.25 or £1.10s | In other countries.....\$5.75 or £1.25s

ADVERTISEMENTS

are inserted in the *Ironmonger and Metal Trades' Advertiser* at the subjoined rates, from which no variation can be made on any ground whatever.

Size of Page—Nine Inches Deep by Six Inches Wide.

One Advertisement of every Series of 13 Monthly, 27 Fortnightly, or 53 Weekly, will be inserted in the *Ironmongers' Diary and Text Book*, published toward the end of each year, and presented to every Subscriber.

	53 INSERTIONS, each net.	27 INSERTIONS, each net.	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	1 INSERTION net.
One page.....	\$20.00	\$22.50	\$25.00	\$30.00	\$35.0	\$50.00
Two-thirds page.....	15.00	16.90	18.75	22.50	26.5	37.50
Half page.....	11.00	12.40	13.75	16.50	17.25	27.50
One-third page.....	8.00	9.00	10.00	12.00	14.00	20.00
Quarter page.....	6.40	7.25	8.00	9.60	11.20	16.00
One-sixth page.....	4.50	5.10	5.65	6.75	7.75	11.30
One-eighth page.....	3.60	4.10	4.50	5.40	6.25	9.00
One-sixteenth page.....	2.00	2.25	2.50	3.00	3.50	5.00

SPECIAL ISSUES.

In the spring and autumn of each year there is published a special issue, the circulation of which is not less than **Twelve Thousand (12,000) copies**.

THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual, presented free to every Subscriber to the *IRONMONGER AND METAL TRADES' ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT,

With which is incorporated *The Universal Engineer*,

is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the next twelve months will be as follow:

NOVEMBER 10, DECEMBER 8, 1883, JANUARY 5, FEBRUARY 2, MARCH 1 and 29, APRIL 26, MAY 24, JUNE 21, JULY 19, AUGUST 16 and SEPTEMBER 13, 1884.

This supplement is published in

FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach, but in the native language of eighty millions of German, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

Advertisements are inserted in any language at the following

MODERATE TARIFFE.

Size of Page—13½ Inches Deep by 9½ Inches Wide.

	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.		13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.
One page.....	\$30.00	\$33.75	\$37.50	Quarter page.....	\$10.00	\$11.25	\$12.50
Two-thirds page.....	22.00	24.75	27.50	One-sixth page.....	7.50	8.45	9.40
Half page.....	17.00	19.15	21.25	One-eighth page.....	6.20	7.00	7.75
One-third page.....	12.50	14.10	15.65	One-sixteenth page.....	3.20	3.40	4.00

Advertisers will do well to use Illustrations freely. Where economy of space is an object, a left page illustrated and described in one language can be suitably described in four or more languages on the opposite or right page without illustrating.

THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of more than twenty years is concerned, will be covered by *THE FOREIGN SUPPLEMENT* at least twice a year. Thus a Price List, Advertisement inserted in the *Ironmonger* and *FOREIGN SUPPLEMENT* is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.

J. HAISH & CO., SOLE MANUFACTURERS OF THE RATTLER.	THE LOWE PATENT FEED WATER HEATER & PURIFIER, FOR Heating and Purifying Water for Steam Boilers. Patented July 12, 1877. Has Straight Tubes. SIMPLICITY, RELIABILITY and EFFICIENCY At Less Cost Than any Other. Write for prices and further information to the manufacturers, Lowe & Watson, BRIDGEPORT, CONN.
---	---

Haish's S Barb Steel Fence Wire, the Pioneer and Duplex Galvanized and Enamelled; barbs locked on both wires, and possess more excellent qualities than any fence ever produced. We also call your attention to the Jacob Haish Wire Fence Stretcher, Double Crank, Double Rope, Center Draft, and offered to the public as the best device in the world for stretching wire fences. Every Stretcher guaranteed to do perfect work or no sale. Send for sample and price list. Liberal discount to jobbers.

HOME OFFICE, DE KALB, ILL.

EMERY AND CORUNDUM

Can be run in WATER, OIL or ACID as well as DRY.

Polishes and Machinists' Supplies.

RUB STONES, EMERY WHEEL MACHINERY
And DIAMOND TOOLS.

CIRCULARS AND PRICE LISTS.

ADDRESS

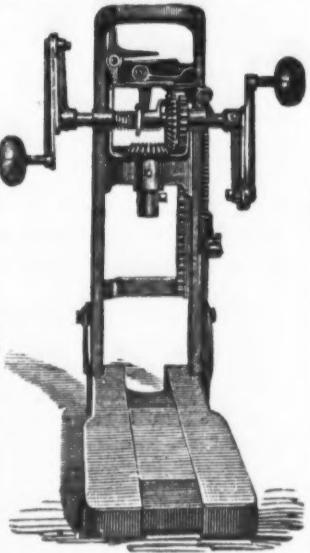
VITRIFIED WHEEL COMPANY,

WESTFIELD MASS., U. S. A.

SAUNDERS' PATENT AUTOMATIC BORING MACHINES FOR BUILDERS' AND FRAMERS' USE.

are universally acknowledged to be superior to all other Boring Machines, and we guarantee to give better satisfaction than any other machine.

Sail Builders, House Builders, Dock Builders, Bridge Builders, Carpenters and Farmers please notice what we claim for our machine, and we guarantee all that we claim: First, that it will nearly double the work of any other machine in the same length of time, with greater ease to the operator; that we can regulate the speed of the bit according to the size of the same, or to suit the operator; it will drive the bit any required speed; it will drive the bit or auger to any required depth, and the bit or auger returns from the hole by the same automatic motion without the operator stopping the machine; at the same time cleaning itself and leaving the hole entirely free from chips; it is gauged to bore holes of any diameter to suit the operator, driving two or more holes at exactly the same depth after being once set, without any attention from the operator; it is an angular machine and will bore on any angle; it is the most compact machine; it can be placed in so small a compass as to occupy but little room in a carpenter's tool chest, and while in this compact form it can be carried in the hand with the greatest ease and convenience; it is the most durable machine from the fact that we use the best material in its construction, and each part can be duplicated in case of accident by sending directly to us. We finish the ironwork in a blackened or heated Japan finish, which will not wear off, and withstand all forms of weather the woodwork being rubbed in oil and shellacked. They are the cheapest Boring Machines in the world for what they can do. We are introducing the Gladwin Improved Auger in connection with this machine. This auger is the best Boring Machine Auger made, being a self-cleaner in gummy or knotty wood. We offer the Borer, boxed and delivered on board cars, for \$6 full set Gladwin Improved Augers, 18 qrs., \$9; or with extra finished beds, \$6.50, and full set augers, 18 qrs., \$9.50. A discount given for large orders. Send for Descriptive Catalogue.



THE W. B. WELLS MFG. CO., Ashaway, R. I.

FOR SALE BY

LOUDERBACK, GILBERT & CO., 33 Chambers St., New York.
FALLMAN & MCFADDEN, 607 Market Street, Philadelphia.
BUHL, SONS & CO., Detroit, Mich.
A. W. BINGHAM & CO., Cleveland, Ohio.
GORDON HARDWARE CO., San Francisco, Cal.
HODGE & HOMER, 47 Randolph Street, Chicago Ill.

Importers of TIN PLATE, METALS, &c.

Mica.

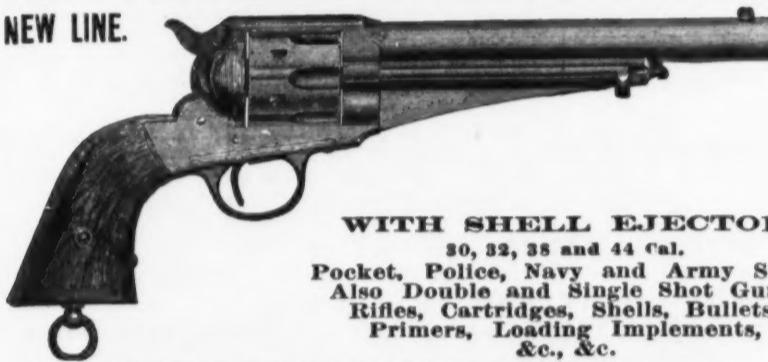
Mica.

Mica.

STOVE BOARDS, ZINC AND CRYSTAL,
Full Stock of Russia Iron from No. 8 to No. 15.

MERCHANT & CO.,
PHILADELPHIA and NEW YORK.

NEW LINE.



WITH SHELL EJECTOR
30, 32, 38 and 44 Cal.

Pocket, Police, Navy and Army Sizes.
Also Double and Single Shot Guns,
Rifles, Cartridges, Shells, Bullets,
Primers, Loading Implements,
&c., &c.

Send for reduced catalogue and discounts of goods manufactured by

E. REMINGTON & SONS,
283 Broadway,

WROUGHT IRON TACKLE BLOCKS.

Swivel Hooks for Rope or Chain,
POLISHED GROOVES, ALL SIZES IN STOCK.

Also Pulley Blocks for Wire Rope,
Headquarters for the

IRVING BRAND WOODEN PULLEY BLOCKS,

McCOY & SANDERS, Manufacturers,
26 Warren Street, New York.

CINCINNATI CORRUGATING CO., CINCINNATI, OHIO.

MANUFACTURERS OF

Superior Corrugated
Roofing, Siding, Ceiling,
Arches, Lath,
Etc.

STEEL and ZINC.

IRON.

For Rolling
Mills, Blast Furnaces,
Foundries, Machine
Shops, Car Shops, Boiler
and Engine Rooms, Etc.

Fire, Water and Wind Proof. Light, Cheap and Durable.

Send for Descriptive Illustrated Catalogue.

Improved Champion Dump

Scraper.



We are the exclusive manufacturers of
Byrket's Improved Dump and
Automatic Steel Scrapers.

We manufacture the only successful Automatic Scraper in the world. Our Dumps are the lightest and strongest scrapers made. We use two pieces of steel pressed into shape, to meet the wants of all classes of Earth Workers. Especially suited for Contractors and Township Road Work. Send for circulars. Manufactured by

THE CHAMPION SCRAPER CO., Troy, Ohio.

NOVELTY IRON FOUNDRY,
HAIGHT & CLARK,
16 & 18 DeWitt Street, ALBANY, N. Y.,
MANUFACTURERS OF FINE GRAY IRON CASTINGS
EVERY DESCRIPTION.

Rosettes and Pickets for Wire Workers. Castings for Furniture and Piano Manufacturers. Iron and Metal Patterns of all kinds a specialty. Correspondence solicited.

JAPANNING.

BRONZING.

R. T. PETTEBONE, PATENT SCOOPS.

Entirely new style; superior finish and quality; best goods made.
No Straps to catch; no Straps to interfere; no Straps to tear off.
We use Best Materials Only in their manufacture, and fully warrant every Scoop. For Price Lists, &c., apply to

Scoop bowl pressed from one solid piece of Cast
Steel. Style A has Solid Front strap.



PAYNE PETTEBONE & SON, WYOMING, PA.

A.

WYOMING SHOVEL WORKS.

A.

FRONT VIEW

A.

BACK VIEW

A.

FRONT VIEW

THE IRON AGE.

PHILADELPHIA.

Corrected Weekly by Lloyd, Supples & Walton.)
Terms, 30 days. For 60 or 90 days, interest added at 10% per cent. per annum.

Awl.	
Pewter Wrights, W. B.	11 @ 11 1/2
Over 200 lbs.	11 1/2
Trenton.	10 1/2
Eagle Anvils, American, 100	dis 20 1/2
Apple Peeler.	dis 50 net
Globe Apple Peeler.	dis 50 net
Penn Apple Peeler.	dis 50 net
Lots of 10 to 24 dozen special prices.	

Axes.	
Hunt's Kentucky and Yankee, per doz.	dis 50 to 60
Robert Mann.	dis 50 to 60
Richardson.	dis 50 to 60
Brown Axes.	dis 50 to 60
Double Bit Axes.	net 11 1/2 to 14 1/2

Augers and Auger Bits.—New List January 1, 1880.

Bates' Nut Augers.

Cook's Augers.

Watson's Augers.

Woroni Pierce Auger Bits.

Griswold Auger Bits.

Cook's.

Jennings' Pat. Hol. Augers, list \$45 per doz.

Bonney's Pat. Hol. Augers, list \$45 per doz.

Burnett's Pat. Hol. Augers, list \$45 per doz.

Balances.

Lith and Common.

Bells.

Bethel Bros. Mfg. Co. Light Hand Bells.

Swiss Hand Bells.

Conn. Door Bells.

Co. Western & Kentucky Cow new list.

Bearings.

Upright, without Augers.

Angular, without Augers.

Beets.—Eastern Carriage Bolts.

Philadelphia.

Stanley, Wrought Shutter.

Barbers.—Barber's.

Buckles.

Spoof.

American Ball.

Buttis.—Cast Fast Joint. Narrow.

" " Broad.

Cast Loose Joint, Narrow.

" " Broad.

Acorn Loose Pin.

Mayer's Loose Joint.

Wrought Loose Pin.

Narrow Fast.

Loose Joint.

Bind Buttons.

Parker.

Clark.

Shepard.

Lau & Porter.

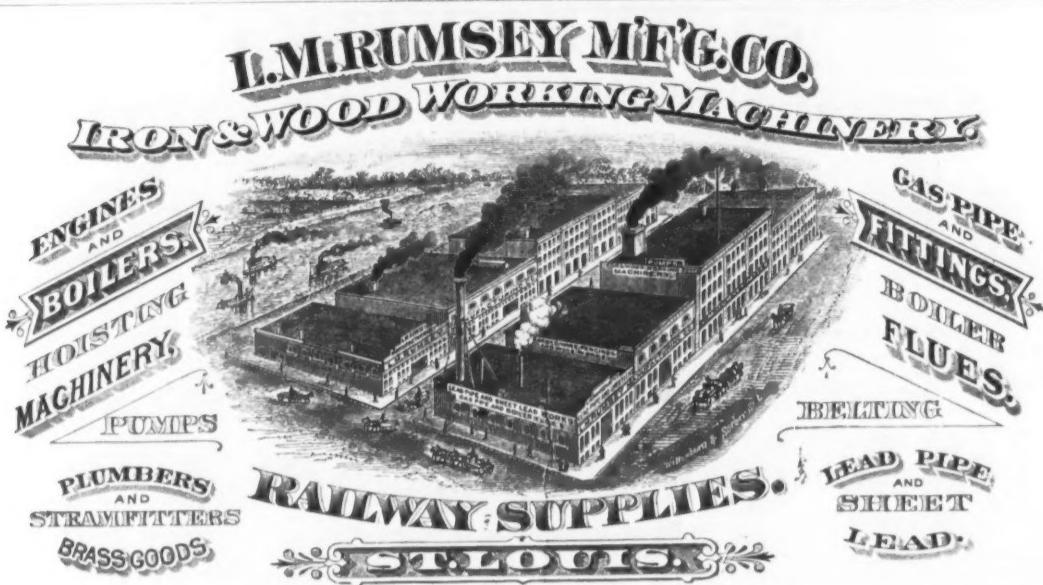
Huffers.

Chains.—German Halters and Coll. list December 31.

Galvanized Pump Chain.

Bear Proof Coil Chain, English.

12 1/2 13 1/2 14 1/2 15 1/2 16 1/2 17 1/2 18 1/2 19 1/2 20 1/2 21 1/2 22 1/2 23 1/2 24 1/2 25 1/2 26 1/2 27 1/2 28 1/2 29 1/2 30 1/2 31 1/2 32 1/2 33 1/2 34 1/2 35 1/2 36 1/2 37 1/2 38 1/2 39 1/2 40 1/2 41 1/2 42 1/2 43 1/2 44 1/2 45 1/2 46 1/2 47 1/2 48 1/2 49 1/2 50 1/2 51 1/2 52 1/2 53 1/2 54 1/2 55 1/2 56 1/2 57 1/2 58 1/2 59 1/2 60 1/2 61 1/2 62 1/2 63 1/2 64 1/2 65 1/2 66 1/2 67 1/2 68 1/2 69 1/2 70 1/2 71 1/2 72 1/2 73 1/2 74 1/2 75 1/2 76 1/2 77 1/2 78 1/2 79 1/2 80 1/2 81 1/2 82 1/2 83 1/2 84 1/2 85 1/2 86 1/2 87 1/2 88 1/2 89 1/2 90 1/2 91 1/2 92 1/2 93 1/2 94 1/2 95 1/2 96 1/2 97 1/2 98 1/2 99 1/2 100 1/2 101 1/2 102 1/2 103 1/2 104 1/2 105 1/2 106 1/2 107 1/2 108 1/2 109 1/2 110 1/2 111 1/2 112 1/2 113 1/2 114 1/2 115 1/2 116 1/2 117 1/2 118 1/2 119 1/2 120 1/2 121 1/2 122 1/2 123 1/2 124 1/2 125 1/2 126 1/2 127 1/2 128 1/2 129 1/2 130 1/2 131 1/2 132 1/2 133 1/2 134 1/2 135 1/2 136 1/2 137 1/2 138 1/2 139 1/2 140 1/2 141 1/2 142 1/2 143 1/2 144 1/2 145 1/2 146 1/2 147 1/2 148 1/2 149 1/2 150 1/2 151 1/2 152 1/2 153 1/2 154 1/2 155 1/2 156 1/2 157 1/2 158 1/2 159 1/2 160 1/2 161 1/2 162 1/2 163 1/2 164 1/2 165 1/2 166 1/2 167 1/2 168 1/2 169 1/2 170 1/2 171 1/2 172 1/2 173 1/2 174 1/2 175 1/2 176 1/2 177 1/2 178 1/2 179 1/2 180 1/2 181 1/2 182 1/2 183 1/2 184 1/2 185 1/2 186 1/2 187 1/2 188 1/2 189 1/2 190 1/2 191 1/2 192 1/2 193 1/2 194 1/2 195 1/2 196 1/2 197 1/2 198 1/2 199 1/2 200 1/2 201 1/2 202 1/2 203 1/2 204 1/2 205 1/2 206 1/2 207 1/2 208 1/2 209 1/2 210 1/2 211 1/2 212 1/2 213 1/2 214 1/2 215 1/2 216 1/2 217 1/2 218 1/2 219 1/2 220 1/2 221 1/2 222 1/2 223 1/2 224 1/2 225 1/2 226 1/2 227 1/2 228 1/2 229 1/2 230 1/2 231 1/2 232 1/2 233 1/2 234 1/2 235 1/2 236 1/2 237 1/2 238 1/2 239 1/2 240 1/2 241 1/2 242 1/2 243 1/2 244 1/2 245 1/2 246 1/2 247 1/2 248 1/2 249 1/2 250 1/2 251 1/2 252 1/2 253 1/2 254 1/2 255 1/2 256 1/2 257 1/2 258 1/2 259 1/2 260 1/2 261 1/2 262 1/2 263 1/2 264 1/2 265 1/2 266 1/2 267 1/2 268 1/2 269 1/2 270 1/2 271 1/2 272 1/2 273 1/2 274 1/2 275 1/2 276 1/2 277 1/2 278 1/2 279 1/2 280 1/2 281 1/2 282 1/2 283 1/2 284 1/2 285 1/2 286 1/2 287 1/2 288 1/2 289 1/2 290 1/2 291 1/2 292 1/2 293 1/2 294 1/2 295 1/2 296 1/2 297 1/2 298 1/2 299 1/2 300 1/2 301 1/2 302 1/2 303 1/2 304 1/2 305 1/2 306 1/2 307 1/2 308 1/2 309 1/2 310 1/2 311 1/2 312 1/2 313 1/2 314 1/2 315 1/2 316 1/2 317 1/2 318 1/2 319 1/2 320 1/2 321 1/2 322 1/2 323 1/2 324 1/2 325 1/2 326 1/2 327 1/2 328 1/2 329 1/2 330 1/2 331 1/2 332 1/2 333 1/2 334 1/2 335 1/2 336 1/2 337 1/2 338 1/2 339 1/2 340 1/2 341 1/2 342 1/2 343 1/2 344 1/2 345 1/2 346 1/2 347 1/2 348 1/2 349 1/2 350 1/2 351 1/2 352 1/2 353 1/2 354 1/2 355 1/2 356 1/2 357 1/2 358 1/2 359 1/2 360 1/2 361 1/2 362 1/2 363 1/2 364 1/2 365 1/2 366 1/2 367 1/2 368 1/2 369 1/2 370 1/2 371 1/2 372 1/2 373 1/2 374 1/2 375 1/2 376 1/2 377 1/2 378 1/2 379 1/2 380 1/2 381 1/2 382 1/2 383 1/2 384 1/2 385 1/2 386 1/2 387 1/2 388 1/2 389 1/2 390 1/2 391 1/2 392 1/2 393 1/2 394 1/2 395 1/2 396 1/2 397 1/2 398 1/2 399 1/2 400 1/2 401 1/2 402 1/2 403 1/2 404 1/2 405 1/2 406 1/2 407 1/2 408 1/2 409 1/2 410 1/2 411 1/2 412 1/2 413 1/2 414 1/2 415 1/2 416 1/2 417 1/2 418 1/2 419 1/2 420 1/2 421 1/2 422 1/2 423 1/2 424 1/2 425 1/2 426 1/2 427 1/2 428 1/2 429 1/2 430 1/2 431 1/2 432 1/2 433 1/2 434 1/2 435 1/2 436 1/2 437 1/2 438 1/2 439 1/2 440 1/2 441 1/2 442 1/2 443 1/2 444 1/2 445 1/2 446 1/2 447 1/2 448 1/2 449 1/2 450 1/2 451 1/2 452 1/2 453 1/2 454 1/2 455 1/2 456 1/2 457 1/2 458 1/2 459 1/2 460 1/2 461 1/2 462 1/2 463 1/2 464 1/2 465 1/2 466 1/2 467 1/2 468 1/2 469 1/2 470 1/2 471 1/2 472 1/2 473 1/2 474 1/2 475 1/2 476 1/2 477 1/2 478 1/2 479 1/2 480 1/2 481 1/2 482 1/2 483 1/2 484 1/2 485 1/2 486 1/2 487 1/2 488 1/2 489 1/2 490 1/2 491 1/2 492 1/2 493 1/2 494 1/2 495 1/2 496 1/2 497 1/2 498 1/2 499 1/2 500 1/2 501 1/2 502 1/2 503 1/2 504 1/2 505 1/2 506 1/2 507 1/2 508 1/2 509 1/2 510 1/2 511 1/2 512 1/2 513 1/2 514 1/2 515 1/2 516 1/2 517 1/2 518 1/2 519 1/2 520 1/2 521 1/2 522 1/2 523 1/2 524 1/2 525 1/2 526 1/2 527 1/2 528 1/2 529 1/2 530 1/2 531 1/2 532 1/2 533 1/2 534 1/2 535 1/2 536 1/2 537 1/2 538 1/2 539 1/2 540 1/2 541 1/2 542 1/2 543 1/2 544 1/2 545 1/2 546 1/2 547 1/2 548 1/2 549 1/2 550 1/2 551 1/2 552 1/2 553 1/2 554 1/2 555 1/2 556 1/2 557 1/2 558 1/2 559 1/2 560 1/2 561 1/2 562 1/2 563 1/2 564 1/2 565 1/2 566 1/2 567 1/2 568 1/2 569 1/2 570 1/2 571 1/2 572 1/2 573 1/2 574 1/2 575 1/2 576 1/2 577 1/2 578 1/2 579 1/2 580 1/2 581 1/2 582 1/2 583 1/2 584 1/2 585 1/2 586 1/2 587 1/2 588 1/2 589 1/2 590 1/2 591 1/2 592 1/2 593 1/2 594 1/2 595 1/2 596 1/2 597 1/2 598 1/2 599 1/2 500 1/2 501 1/2 502 1/2 503 1/2 504 1/2 505 1/2 506 1/2 507 1/2 508 1/2 509 1/2 5010 1/2 5011 1/2 5012 1/2 5013 1/2 5014 1/2 5015 1/2 5016 1/2 5017 1/2 5018 1/2 5019 1/2 5020 1/2 5021 1/2 5022 1/2 5023 1/2 5024 1/2 5025 1/2 5026 1/2 5027 1/2 5028 1/2 5029 1/2 5030 1/2 5031 1/2 5032 1/2 5033 1/2 5034 1/2 5035 1/2 5036



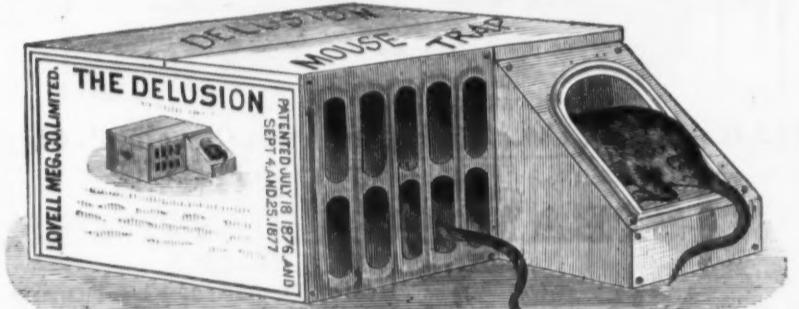
HENRY B. NEWHALL CO.
105 Chambers Street
AND
89 Reade Street,
NEW YORK.

MANUFACTURERS' AGENTS FOR
Chamfered and Trimmed, Square
and Hexagon
MACHINERY NUTS.

SQUARED AND TAPPED
HEXAGON NUTS,
U. S. Government Standard Threads,
WARRANTED INTERCHANGEABLE.

Turn-Buckles, Clinch Rings, Bolt Ends, Chain
Links Ship Chandlery Hardware.

THE DELUSION MOUSE TRAP.



The Mouse goes in to get the bait,
And shuts the door by his own weight,
And then he jumps right through a hole,
And thinks he's out, but bless his soul,
He's in a cage, somehow or other,
And sets the trap to catch another.

Manufactured Exclusively by the LOVELL MFG. CO., Limited, Erie, Pa.

TO THE TRADE.—Having purchased the PATENTS, TRADE-MARK, TOOLS, and everything pertaining to the DELUSION MOUSE TRAP, formerly owned by Messrs. Claudius Jones & Co., we are now the exclusive owners and manufacturers of that trap, and are prepared to supply the trade in any quantity and of superior quality. OVER ONE MILLION FIVE HUNDRED THOUSAND Delusion Traps have been sold. It is THE LEADING TRAP IN THE MARKET.

We also manufacture the BONANZA Mouse Trap.

LOVELL MFG. CO., Limited, Erie, Pa.

T. H. BULLOCK,
BELLows AND FORCE MANUFACTURER,
55 & 57 Columbus St.,
CLEVELAND,
OHIO.



Iron Shingles.
Double Cap,
Corrugated,
Crimped,
Bead.

MOSER & THOMPSON,
Manufacturers of
IRON ROOFING AND SIDING.

Send for Circular and
Price List No. 33.

28-32 River St., Cleveland, O.

THE REIHER SELF-LOCKING IMPROVED TRANSOM LIFTER.

A represents the Stationary Locking Bar; B the Self-Locking Adjusting Block; C the Operating Rod; D the Lower Bracket; E the Lifting Arm; F the Transom Bracket.



With this Adjustable Locking Bar and Lifting Arm, the opening of the transom can be made larger or smaller without the least inconvenience.

Regular Sizes of Lifters for the Trade:
14 in., 16 in., and 18 in.

Duplicates of Arm E, in different lengths, furnished with first order.

F. A. REIHER & CO.,
MANUFACTURERS,
Nos. 11 & 13 South Canal St.,
CHICAGO, ILL.

CATALOGUES ON APPLICATION.



THE WOODRUFF'S PATENT CELEBRATED AMERICAN SUSPENDING EAVE TROUGH HANGER. The best in the world. Manufactured by GEO. W. HEARTLEY, 301 St. Clair St., Toledo, Ohio. Send for prices.



HILLEBRAND & WOLF.



C-SPRING CART CO.,
RUSHVILLE, IND.

We are making a Road Cart that is strong, light, easy to get in and out of. Our show No. 3, with seat swung back ready to enter. Write for catalogue and prices.

GUN POWDER.
Laflin & Rand Powder Co.,

No. 29 Murray Street, New York,
Manufacture and sell the following celebrated brands of Sporting Powder known everywhere as

ORANGE LIGHTNING,
ORANGE DUCKING,
ORANGE RIFLE,

more popular than any Powder now in use.

Blasting Powder and Electrical Blasting Apparatus.

Military Powder on hand and made to order.

SAFETY FUSE, FRICTIONAL & PLATINUM FUSES.

Pamphlets showing sizes of grain sent free.

THE DUPLEX INJECTOR.
SIMPLE,
RELIABLE
AND
DURABLE.

The constantly increasing Sales of this Injector attest its Superiority as a Boiler Feeder.
Manufactured by

JAMES JENKS,
48, 50, 52 and 54 Randolph St.,
DETROIT, MICH.

Experienced in soliciting United States and Foreign Patents, and in preparing applications for the United States Patent Office. Personal attention to every case from beginning to end. Practical and theoretical knowledge of the mechanic arts. Prompt and skillful preparation of applications for Patents. Desires Trade-Marks and Letters of Protection. Searches and Opinions as to scope, validity and infringement. Terms reasonable, and always agreed upon. Terms of payment are increased. Send for circular. Ten Years' Experience.

E. B. STOCKING,
Attorney-at-Law,
U.S. Patent Office. WASHINGTON, D. C.

T. NEW'S
Prepared

ROOFING

FOR STEEP OR FLAT ROOFS.

Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW, 39 John St., New York.
BARRETT, ARNOLD & KIMBALL, Western Agts.
CHICAGO, ILL.

THE REIHER SELF-LOCKING IMPROVED TRANSOM LIFTER.

A represents the Stationary Locking Bar; B the Self-Locking Adjusting Block; C the Operating Rod; D the Lower Bracket; E the Lifting Arm; F the Transom Bracket.

With this Adjustable Locking Bar and Lifting Arm, the opening of the transom can be made larger or smaller without the least inconvenience.

Regular Sizes of Lifters for the Trade:
14 in., 16 in., and 18 in.

Duplicates of Arm E, in different lengths, furnished with first order.

F. A. REIHER & CO.,
MANUFACTURERS,
Nos. 11 & 13 South Canal St.,
CHICAGO, ILL.

CATALOGUES ON APPLICATION.



THE WOODRUFF'S PATENT CELEBRATED AMERICAN SUSPENDING EAVE TROUGH HANGER. The best in the world. Manufactured by GEO. W. HEARTLEY, 301 St. Clair St., Toledo, Ohio. Send for prices.

H. A. BOYNTON,
BROKER IN IRON
7 WALL ST., N.Y.

CATALOGUES ON APPLICATION.

BOSTON.

Reported by Macomber, Bigelow & Dousie.

Anvil & Vise.—No. 1, \$6.50; 2, 4.25; 3, 3.50 each.

Augers & Bits.—Snel's Auger.

L'Hommedieu's Ship Auger.

Jenning's Bits.

Glock's Bits.

Shepardson's Double-Cut Bits.

Shepardson's Double Gimlets.

Stearn's External Gimlets.

No. 2, \$1.00; 4, \$2.00; No. 3, \$2.50; \$6.00 list.

Bannister's Hollow Augers.

Pierce's Bits.

Griswold Bits.

Axes.—Blue Jackets.

Red Cross.

Red Cross Headed Boys.

At Handles.—

Oak Extra, 31 in., No. A.

Oak Extra, 34 in., No. A.

Oak Extra, 31 in., No. B.

Oak Extra, 34 in., No. B.

Oak Extra, or 34 in., No. C.

Oaks 1-3.

Axle Clips.

Balances.—Chatillon's.

Barn Door Rail.

Cast Angle (for Anti-Friction Hangers).

Cast Half Round.

Wrought Round.

Blind Fast.—Lock Fast.

No. 6 Fastas.

Venato Fastas.

Shedd's 2nd Hinges.

Marl Hook, 3 holes.

C Sets.

Brae Arms & Handles.

Brackets Available.

Bridgeway Iron Carriage.

Common Iron Carriage.

Brixton.—Refined.

Burke Machines.

Eagle Upright each.

Eagle Angle each.

Snell Angles.

Braces.—Barber's.

Spoofford's.

Hoover's.

Bracket Saws.—Holy Scroll Saw.

each \$1.50.

Bracket Saws, extra quality, to No. 5.

Steel Frame, with patterns.

Lester.

New Rogers, all iron.

Bracket Saw Blades.—Griffith's pat.

gross \$100.

Brass & Brass.

Brass & Copper.

Brown & Brown.

Brown & Sons.

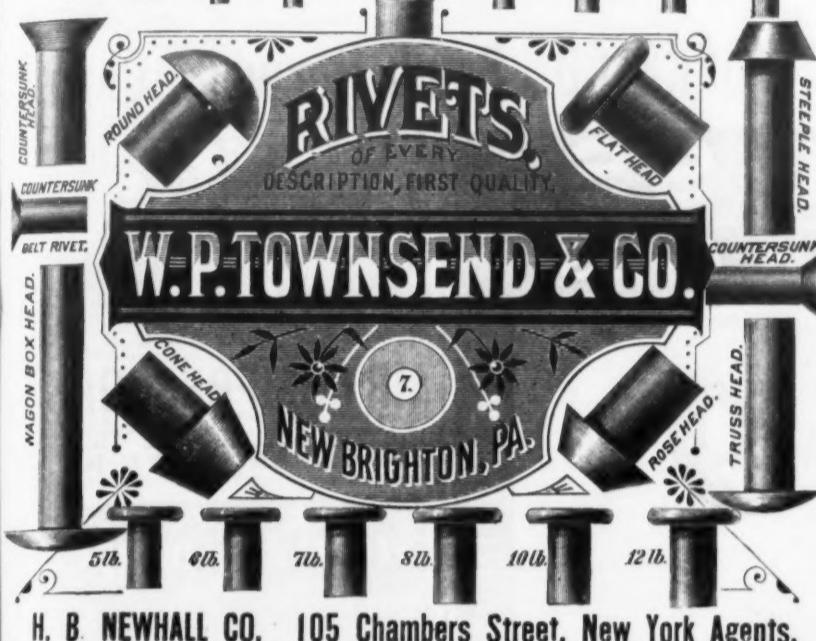
</div

McNab & Harlin Mfg. Co.,
MANUFACTURERS OF
BRASS COCKS AND VALVES,
For STEAM,
WATER,
and GAS.
Wrought Iron
Pipe
and Fittings,
PLUMBERS'
MATERIALS.

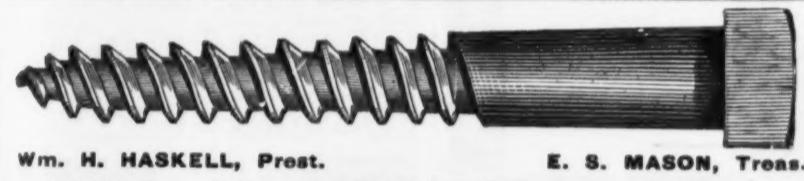
Factory, Paterson, N. J.

Our new Illustrated Catalogue and Price List is now ready, and will be sent to the trade with their first order, or by express, if desired, before ordering.

8oz. 10oz. 12oz. 1lb. 15lb. 1½lb. 1lb. 2lb.



H. B. NEWHALL CO. 105 Chambers Street, New York Agents.



Wm. H. HASKELL, Pres.
WM. H. HASKELL CO.,
Pawtucket, R. I.

MANUFACTURERS OF
COACH SCREWS,
(With Gimlet Points.)

Machine and Plow Bolts,
AND
TAP BOLTS.

STANDARD NUT CO.,
Pittsburgh, Pa.

MANUFACTURERS OF
HOT PRESSED
Square & Hexagon Nuts,
R. R. FISH BARS,
BOLTS.

Henry B. NEWHALL CO.,
105 Chambers St., New York,
and 47 Pearl St., Boston,
(J. H. WORK, Manager),
EASTERN AGENTS.

SPIKES.

RIVETS, &c.

Philadelphia "STAR" Bolt Works.

NORWAY IRON FANCY HEAD BOLTS,
Carriage & Tire Bolts. Star Axle Clips, &c.
TOWNSEND, WILSON & HUBBARD, 2301 Cherry Street, Philadelphia, Pa.

G. W. Bradley's Edge Tools.

Butchers' Cleavers,
Butchers' Choppers,
Axes and Hatchets,
Crab Hoes and Mattocks,
Mill Picks,
Box Chisels and Scrapers,

FOR SALE BY

MARTIN DOSCHER, Agent, 85 Chambers Street, N. Y.

BLAKE CRUSHER CO.,
New Haven Conn.

BLAKE'S Challenge Rock Breakers.

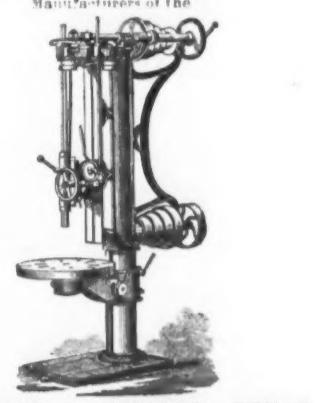
Patented Nov. 18, 1879.

See The Iron Age first issue of the month.

WHISTLE CHIMES TO ORDER.

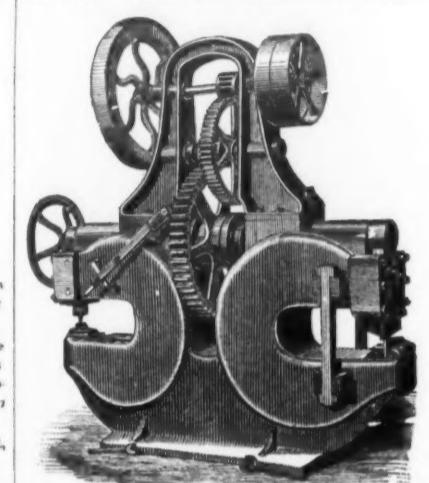


P. BLAISDELL & CO.,
WORCESTER, MASS.
Manufacturers of the



'BLAISDELL" UPRIGHT DRILLS
And other First-Class Machinists' Tools.

COMBINED
PUNCH & SHEARS.



Lambertville Iron Works,
A. WELCH.
LAMBERTVILLE, N. J.

Holt's Forges.
FIVE SIZES.
FOR ALL KINDS OF WORK.
SIO and Upward
Send for circulars.
HOLT MFG. CO.,
Cleveland, Ohio.

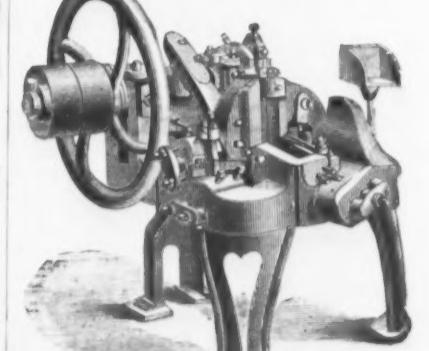
THE "EDDY" STRAIGHTWAY
VALVES.
ALSO
FIRE HYDRANTS.
AXE, Hatchet, Powder and
Brush Machinery.
THE EDDY VALVE COMPANY.
WATERFORD, N. Y.
AGENTS IN ALL PRINCIPAL CITIES.
Send for Price List.

Established 1838.
Bevin Bros. Mfg.
Co.,
Easthampton, Ct.
Manufacturers of
SLEIGH BELLS.
House, Tea, Hand,
Gong Bells, &c.
Bell Metal Kettles.

Best, Cheapest and
Fastest Selling
POTS
On the Market.
Send for discounts.
R. C. PURVIS,
407 Cherry St.,
PHILADELPHIA.
BAILY PORTABLE HOIST.

Warranted double the power and not one-half the
price of other hoisters. As a proof of the above, I
will give them 10 days on trial. Send for catalogue
and price list.

J. DUNN,
Cor Dunham and Astor Ave., Cleveland, Ohio.



PITTSBURGH MFG. CO.,
Manufacturers of Nail and Spike Machines, Bolts,
Nuts, Washers, Rivets, &c. Castings, Forgings and
Blacksmith Work promptly attended to.
94ce and Works Railroad St., near 28th, Pittsburgh, Pa.

ESTABLISHED 1852.
LAKE ERIE IRON CO.
MANUFACTURERS OF
Bar Iron, Hot Pressed Nuts,

Machine Bolts,

Bridge and Roof Bolts and Rods,

CARRIAGE BOLTS, TRACK BOLTS,

Bolt Ends, Eye Bolts, Lag Screws, Wrought Washers,

Extra Large Sizes Bolts and Nuts, Iron and
Steel Forgings, Crank Pins, Piston Rods, &c.

Iron and Steel Car and Locomotive Axles,

106 St. Clair Street,
CLEVELAND,
OHIO.

52 Broadway,
Room 46,
NEW YORK

Clasp closed.

Sole Manufacturers in U. S. A. of our
Celebrated Clasp opened.

METALINE AND
Improved Sleeve Roller
Bush Tackle Blocks.

Also a full line of every variety of
TACKLE BLOCKS.

Try Us with a Sample Order.

Send for Illustrated Catalogue.

New York Warehouse, 33 South Street.

Western Agency: GURNEY & PHALEN, 247 Lake St., CHICAGO.

BAGNALL & LOUD,
BOSTON, MASS.
Clasp closed.

Clasp opened.

METALINE AND
Improved Sleeve Roller
Bush Tackle Blocks.

Also a full line of every variety of
TACKLE BLOCKS.

Try Us with a Sample Order.

Send for Illustrated Catalogue.

Chicago Works:

No. 10 N. Jefferson Street.

NEW YORK OFFICE

92 & 94 Liberty Street.

HOISTING ENGINES
FOR
Blast Furnaces, Coal
and Iron Mines.

CRANE BROS.' MFG. CO.

CHICAGO WORKS:

No. 10 N. Jefferson Street.

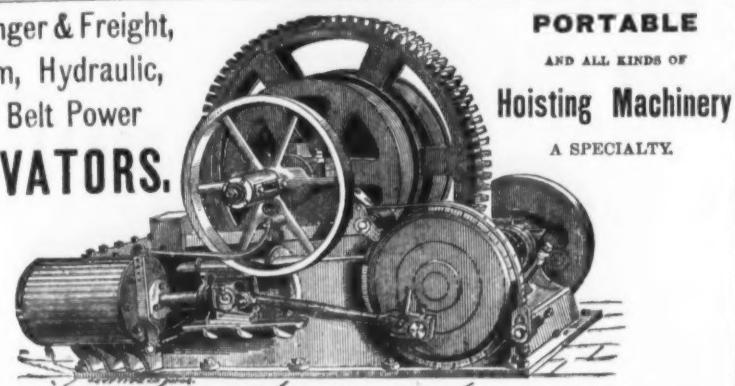
NEW YORK OFFICE

92 & 94 Liberty Street.

THE GREATEST
ROCK BREAKER
ON EARTH
CAPACITY 1 TON A MINUTE
GATES IRON WORKS
50-52 CANAL ST. CHICAGO.

SEND FOR
CIRCULARS

Passenger & Freight,
Steam, Hydraulic,
and Belt Power
ELEVATORS.

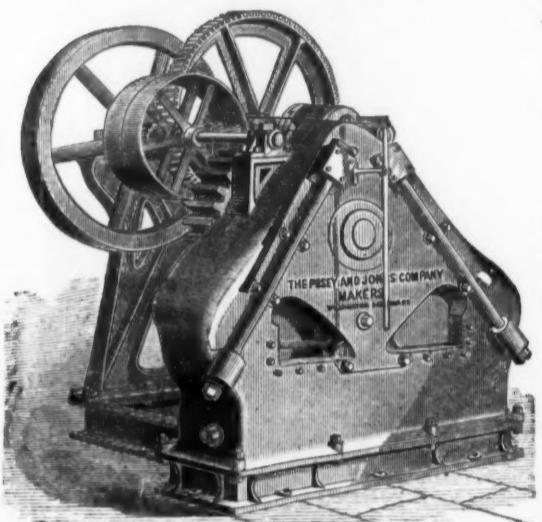


PORATBLE
AND ALL KINDS OF
Hoisting Machinery
A SPECIALTY.

IRON FURNACE HOIST,

For Handling Stock to Top of Stack with One or Two Platforms.
STOKES & PARRISH, 95 & 97 Liberty St., N. Y., 3001 Chestnut St., Phila.

THE PUSEY & JONES COMPANY,
WILMINGTON, DELAWARE,
BUILDERS OF



STEAM ENGINES,
Boilers, Tanks,
MACHINERY FOR ROLL-
ING MILLS,
Punches, Shears,

Machines for Cutting off and
Slitting old Railroad Rails previous
to being piled in Rolling
Mills.

Steam Riveting Machines,
Applicable to Bridge Builders' Work.

RIGHT AND LEFT ANGLE
IRON CUTTERS,

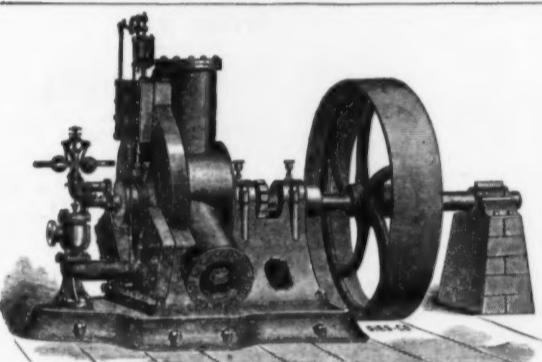
Hydraulic Bending
Machines,

AND HEAVY MACHINERY
GENERALLY.

**GARDNER'S
PATENT
Three Cylinder
ENGINE.**

The Most Simple and
DURABLE
Steam Engine in Use.
Adapted for any duty.
Send for Illustrated
CATALOGUE

Giving full Description.



EVERY ENGINE WARRANTED.

OVER 5000 H. PR. IN USE. Correspondence invited. Special Engine for HIGH SPEEDS, prices
of which will be quoted upon application. MANUFACTURED

EXCLUSIVELY

BY R. DUNBAR & SON, Buffalo, New York, U. S. A.

**THE NOTEMAN ROTARY ENGINE
AND PUMP CO.**

TOLEDO, OHIO.

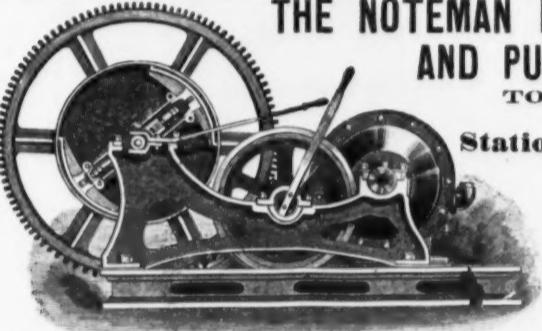
MANUFACTURE
Stationary & Hoisting

ENGINES

High Speed Engines.

H. H. BALCH,

56 John St., New York.



Ludlow Valve Mfg. Co.

OFFICE AND WORKS:

938 to 954 River St. & 67 to 83 Vail Ave., Troy, N. Y.

VALVES.

Double and Single Gate, $\frac{1}{2}$ in. to 48 in.—outside and inside Screws, Indicator, &c.
for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.

DROP FORGINGS

Of Every Description a Specialty.

ADDRESS,

R. H. BROWN & CO..
WESTVILLE, CONN.

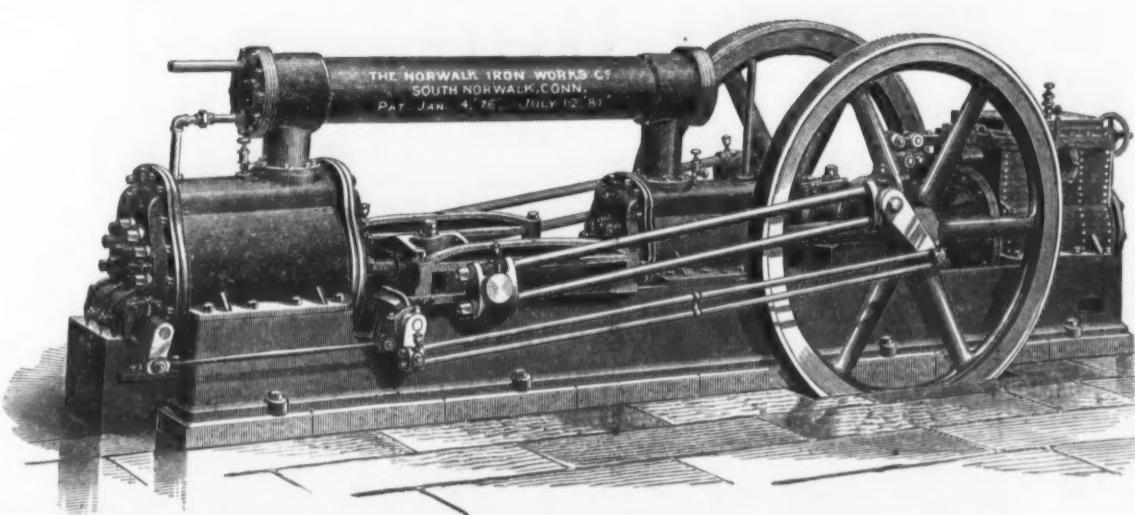
Also Manufacturers of

W. A. CLARK'S PATENT EXPANSIVE BIT,
CLARK'S PATENT HANDLE SCREW DRIVER,

And Other Specialties in Hardware Line.

FITTINGS. Malleable and Gray Iron, All Kinds.
STAR MACHINE WORKS. Write for Prices.
Cleveland, O.

Air Compressors.



THE NORWALK IRON WORKS CO., South Norwalk Conn.

E.W. BLISS
PRESSES & DIES.



**SPECIAL MACHINERY FOR TIN & SHEET
METAL WORKERS**
PLYMOUTH, PEARL
& JOHN ST'S. } BROOKLYN, N.Y.

MANNING, MAXWELL & MOORE,

Bole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



Manufacture of Patent Machine Relieved Nut, Hand, Blacksmith and Machine Screw Taps, Screw Plates, Tap Wrenches and Patent Relieved Pipe Taps and Pipe Reamers; also of Solid Bolt and Pipe Dies. Furnished in U. S. Standard and Whitworth shape of threads.

111 Liberty Street. NEW YORK.

THE HANCOCK INSPIRATOR.

The best Feeder known for Stationary, Marine and Locomotive Boilers.

REQUIRES NO OILING.

Consumes Less Steam Than Any Other Boiler Feeder.

SIMPLE, RELIABLE AND ALWAYS IN ORDER.

FAIRBANKS & CO.

311 Broadway. NEW YORK.

THOS. H. DALLETT & CO.,
SUCCESSORS TO
THORNE, DeHAVEN & CO., Drilling Machines,
21st Street, above Market, Philadelphia.

PORTABLE DRILLS, Driven by power in any direction. **RADIAL DRILLS**,
Self-feed—Large Adjustable Box Table. **VERTICAL DRILLS**, Self-feeding **MUL-**
TIPLE DRILLS, 2 to 20 Spindles. **HORIZONTAL BORING AND DRILLING**
MACHINES. **HAND DRILLS**. **CAR BOX DRILLS**. **SPECIAL DRILLS**,
For Special Work.

Standard Weight Lap Welded
WROUGHT IRON PIPE, &c.,

STEAM PUMPS, &c.,

STEAM AND HYDRAULIC

Freight & Passenger Elevators, &c.

STEAM HOISTING ENGINES, &c.

MANUFACTURED BY

CRANE BROS. MFG. CO.

CHICAGO.

Send for Catalogue.

**CLAY PIGEONS
AND TRAPS.**

WHOLESALE ONLY. AGENTS WANTED.

ADDRESS:

THE CLAY PIGEON COMPANY,

166 Main Street, CINCINNATI, OHIO.

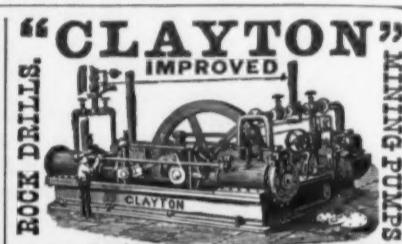
MARTIN REYNOLDS,

354 Lorimer St., Brooklyn, E. D.,

Brass Smelter & Refiner.

Ingot Brass for Car Bearings a specialty.

Brass washings for bell makers always on hand.



"CLAYTON" IMPROVED

MINING PUMPS

ROCK DRILLS.

AIR COMPRESSORS

FOR CATALOGUES, ESTIMATES, ETC. ADDRESS,

CLAYTON STEAM PUMP WORKS

45 & 47 YORK ST., BROOKLYN, N.Y.

(Near Approach to New York & Brooklyn Bridge.)

RIVAL STEAM PUMPS

THE CHEAPEST AND THE BEST

HOT & COLD WATER.

\$35.00 UPWARDS.

MANUFACTURED BY

JOHN H. McGOWAN & CO., CINCINNATI.

DEAD-STROKE POWER HAMMERS.



CONSTRUCTION IMPROVED.

Prices Reduced.

5 to 250 Pounds.



Milling Cutters, all Shapes and Sizes. Gear Cutting and Milling in all its Branches. Index Plates Drilled Accurately. Special Tools and Machinery Designed and Built to Order.

DIENELT & EISENHARDT, MAKERS,

1510 Howard St., Philadelphia.

E. E. GARVIN & CO.,

Machinists and Manufacturers of

MILLING MACHINES, DRILL PRESSES, HAND

LATHES, TAPPING MACHINES,

CUTTER GRINDERS & WOOD PLANERS.

Power Milling Machine.

141 Centre St., New York. Send for Illustrated Catalogue.



CONCORD USE N.H. GENUINE CONCORD AXLES

Manufactured only by CONCORD AXLE CO.,

D. ARTHUR BROWN, Treasurer,

PENACOOK (CONCORD), N. H.

HORIZONAL PRESSSES.

Manufacture of all Descriptions of

PRESSSES.

Catalogues and prices sent on application.

Machinery, &c.**LYON'S HAND OR POWER PUNCHES AND SHEARS.**

For Round, Flat or Square Iron,
ALSO,
Polishing & Buffing Machinery,
HYDRAULIC JACKS,
To raise from 3 to 120 tons.
Hydraulic Presses for Special & General Use.
HYDRAULIC HAND & POWER PUMPS
with 1 to 6 plungers, to run hydraulic presses, with
either uniform or changeable speed.
Second-hand Presses.

WATSON & STILLMAN,
(Successors to E. LYON & CO.)
470 B Grand Street, NEW YORK.
Send for circular of what you want.

**THE MACKENZIE PATENT CUPOLA & BLOWER.**

Send for circular to

Smith & Savre Mfg. Co.,

PROPRIETORS, 246 Broadway, New York.

**NEW OTTO SILENT GAS ENGINE.**

Working Without Boiler, Steam Coal, Ashes or Attendance.
Started Instantly by a Match, it gives Full Power Immediately.

When Stopped, all Expense Ceases.

No explosions, no fire, no chilfers, no gauges, no pumps, no engineer or other attendants while running. Recommended by insurance companies.

UNSURPASSED IN EVERY RESPECT for hoisting in warehouses, printing, ventilating, running small shops, &c.

1, 2, 4, 7, 10, 15 and 25 Horse-Power. Built by **SCHLEICHER, SCHUMM & CO.**, Engineers and Machinists, N. E. Cor. 33d & Walnut Sts., Philadelphia, 214 Randolph St., Chicago.



STEPHEN A. MORSE.

C. M. WILLIAMS.

EDWIN F. MORSE

LATEST
PATENTED
IMPROVEMENTS**CLEM & MORSE,**

Manufacturers and Builders of

ELEVATORS,

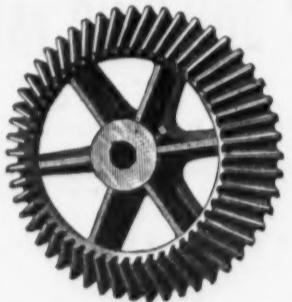
Hoisting Machinery, Automatic Hatch Doors, &c.

413 Cherry St., PHILADELPHIA, PA. Branch Office, 108 Liberty St., NEW YORK.

**HOISTING ENGINES.**

We are now prepared to deliver 6x12 and 7x12 single cylindered Horizontal Engines, and double cylindered at short notice, with the *Frisbie Friction Clutch* attached, with or without boiler. The clutch has proved to be the best in the world for this work. It can be so adjusted that it will do a small amount of work, and from that up to the full power of engine, with no risk of breaking ropes, gearing or engine, a feature which no other friction contains. Address.

D. FRISBIE & CO., 481 N. Fifth St., Phila., Pa.

MACHINE MOLDED GEARING

SHAFTING, PULLEYS AND HANGERS
A Specialty.

POOLE & HUNT, BALTIMORE, MD.

First-Class, Heavy, Double and Treble Geared

ENGINE LATHES

For Railway Shops, Rolling Mills and Machine Shops.

HORIZONTAL BORING LATHES,
FOX LATHES, LIFTING JACKS
and CORNICE MACHINERY.

GEO. A. OHL & CO., East Newark, N. J.

DRILL PRESSES.

New Upright Power Drill Presses. No. 4 average sizes; back gear, quick return. A strong iron brace extends from base to head of column—a new feature. Weight, 1100 lbs.; height, 6 feet. Price, \$310.

No. 1½, on legs, swing 1¾ inches, 4 speeds. Price, \$75.

No. 1 size, to set on bench, swings 13 inches, lever feed, 3 speeds, tight and loose pulleys. Price, \$35.

Fearless Punch & Shear Co., 38 W. Dey Street, New York.



PUNCHING & SHEARING PRESSES.
Power, Foot or Hand
PUNCHES, AND SHEARS.

All sizes, from \$25 to \$2000

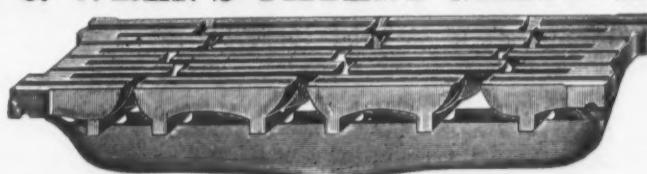
Peerless Punch & Shear Co., 38 W. Dey Street, NEW YORK CITY.

DAVID S. CRESWELL, Manufacturer,

516 Race Street, THE most durable Grate Bar on the market.

PHILADELPHIA, PA.

Send for circular and price list.

W. C. WREN'S PATENT GRATE BAR.**DAVID S. CRESWELL, Manufacturer,**

516 Race Street, THE most durable Grate Bar on the market.

PHILADELPHIA, PA.

Send for circular and price list.

The Farrel Foundry and Machine Co.

ANSONIA, CONN., Manufacture Improved

ROCK & ORE BREAKERS,

THE "BLAKE" STYLE,

designed for breaking to small

pieces and one-third dust all kinds

of hard and brittle substances, such

as Quartz, Emery, Glass and

Silver Ores, Coal, Plaster,

Iron, Copper and Lead Ores;

also, Stone for making Concrete

and Railroad Ballast.

Twenty years of practical experience

ever invented for the purpose.

Mr. S. L. MARSH, for the past fifteen years connected with the manufacture

of these machines, has charge of this department of our works, and will personally superintend their operation within a reasonable circuit.

Gold Medal awarded at the Massachusetts Mechanic Association, 1881,

and Silver Medal (special) at American Institute, New York, 1882.

COPELAND & BACON, General Agents, 55 Liberty St., New York.



Medal of Superiority, American Institute Fair, 1881.

AWARDED TO THE Farrel Foundry and Machine Co.

1876.

NEW YORK.

View of Rock Breaker.

Twenty years of practical experience ever invented for the purpose.

Mr. S. L. MARSH, for the past fifteen years connected with the manufacture

of these machines, has charge of this department of our works, and will personally superintend their operation within a reasonable circuit.

Gold Medal awarded at the Massachusetts Mechanic Association, 1881,

and Silver Medal (special) at American Institute, New York, 1882.

COPELAND & BACON, General Agents, 55 Liberty St., New York.

Machinery, &c.**CORLISS ENGINE BUILDERS**

WITH WETHERILLS IMPROVEMENTS

ENGINEERS, MACHINISTS, IRON FOUNDERS,

BOILER MAKERS,

ROBT. WETHERILL & CO. Chester, Pa.

STOW FLEXIBLE SHAFT CO., Limited

15th & Pennsylvania Ave.

PHILADELPHIA, PA., Manufacturers of

Portable Drilling, Tapping, Reaming and

Boring Machines.

Also, Tools for Emery

Wheel Grinding, Metal & Wood

Polishing, Cattle Brushing & Cleaning, &c.

General European Agents, BULLING & LOWE, Lawrence Pountney Hill, London, England.

CHARLES W. ERVIE & CO.,

Engine Builders, Boiler Makers and

GENERAL MACHINISTS,

IRELAND STREET, PHILADELPHIA.

PHILA. SHAFTING WORKS.

GEO. V. CRESSON,

18th & Hamilton Sts.

PHILADELPHIA.

SHAFTING A SPECIALTY

Manufacturers of

Shafting, Pulleys.

Hangers, Couplings, and every apparatus

used in the TRANSMISSION OF STEAM POWER.

ISRAEL H. JOHNSON, Jr., & CO.,

Tool and Machine Works,

Manufacturers of

ENGINE, BRASS FINISHERS, WOOD TURNERS

AMATEURS' AND JEWELERS' LATHE,

Slide Rest, Screw Machines, Turret Heads, Screw

Presses, Screw Clamps, Lathe Carriers, &c.

1422, 1424 & 1426 Callowhill Street, Philadelphia, Pa.

Israel H. Johnson, Jr. Joshua R. Johnson, Jr.

Established 1867.

Edwin Harrington & Son

MANUFACTURERS OF

PATENT EXTENSION AND SCREW CUTTING

LATTHES

Iron Planers,

Radial, Upright, Suspension

Multiple and Lever

DRILLS,

and a variety of other

MACHINISTS' TOOLS

Double Chain Screw

Pulley Blocks,

Unrivaled for Durability, Safety and Power.

Patent Double Chain Quick-Lift Bolts,

with Brake for quick and

powerful lifting.

Circulars furnished.

WORKS AND OFFICE,

Cor. N. 13th and Penna. Ave.,

Philadelphia, Pa., U. S. A.

R. H. KIMBALL, 12 Cortlandt St., N. Y.

C. E. KIMBALL, 101 High St., Boston, W. H. RICKETTY, 115 Main St., Cincinnati.

Established 1867.

WM. McFARLAND

Iron and Brass Founder,

TRENTON, N. J.

Chilled Cast Wire Dies a Specialty.

Any size or style made at short notice.

Mention the Iron Age.

WE CHALLENGE THE WORLD FOR ITS EQUAL

The cheapest, most durable and effective Tool for Cleaning Tubes Hot or Cold.

RUFFNER & DUNN, Schuylkill Falls, Philadelphia, Pa.

Patentees and Sole Manufacturers of the EXCELSIOR

STEEL TUBE CLEANERS. Most liberal discount to dealers.

Send for Circulars.

G. E. BRETTELL,

Furnace St.

Rochester, N. Y.

Planers a Specialty

26x36, 30x36 and 30x30

in. to plane 7 and 10 ft. long.

SEND FOR PRICE LIST.

G. E. BRETTELL,

Rochester, N. Y.

Mention the Iron Age.

G. E. BRETTELL,

Rochester, N. Y.

Mention the Iron Age.

G. E. BRETTELL,

Rochester, N. Y.

Mention the Iron Age.

G. E. BRETTELL,

TUBAL SMELTING WORKS,
760 & 762 Broad Street, PHILADELPHIA.
PAUL S. REEVES,
MANUFACTURER OF
GENUINE BABBITT METAL
AND ALL GRADES OF
ANTI-FRICTION METALS.
ESTABLISHED 1842.

WM. & HARVEY ROWLAND,
PHILADELPHIA.

P. O. Address: Frankford, Pa. MANUFACTURERS OF ALL KINDS OF

Elliptic, Platform & C Springs,
Brewster Side-Bar Combination Patented" Springs and
Timken's Patent Cross Springs,
Reiff's Patent, Groot's Patent, Carter's Patent and Saladee's Patent Crescent Spring,
MADE EXCLUSIVELY FROM
SWEDISH STOCK, OIL-TEMPERED and WARRANTED.
Swedish Tire, Toe Blister and Spring Steel.

CAST SPRING AND PLOW STEEL.
CAST SHOVEL, HOE AND MACHINERY STEEL.

OXFORD OE, SLEIGH, TIRE AND SPRING STEEL.
BESSEMER SHOVEL AND PLOW STEEL.
BESSEMER MACHINERY AND CULTIVATOR STEEL.

RE-ROLLED NORWAY SHAPES.
NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

STEEL CASTINGS
CHESTER STEEL CASTINGS CO.,
Works, Chester, Pa. 407 Library st., Philadelphia.

PITTSBURGH STEEL CASTING CO.,
26th and Railroad Streets, PITTSBURGH, PA.

MANUFACTURERS OF

Refined Bessemer Steel; ALSO Improved Steel Castings
Under Hainsworth's Patents.

We are now prepared to fill orders for refined BESSEMER BILLETS or BLOOMS
of any desired carbon and a uniform quality.

We would call attention of consumers to the fact that we use good material, and produce a steel
pronounced by competent judges equal to the best English or German spring and soft steels.

Having had twelve years' experience in the making of **STEEL CASTINGS**,
we are able to refer to our customers in all parts of the United States and Canada as to the quality of
our work in this line. We make castings of steel practically free from blow-holes, as soft and easily
worked as wrought iron, yet stiff, strong and durable, with a tensile strength of not less than 65,000
pounds to the square inch. In short, our castings unite the qualities of steel and wrought iron.

Wheels, Pinions, Cranks, Dies, Hammer Heads, Engines and Machinery Castings of all
descriptions, Railroad Frogs and Crossings, Plowshares, Moldboards and Landsides.
Special attention given to Heavy Castings. We use no cast iron in our castings. Send for circular.

ROP HAMMERS.
Punching Presses.
DIES AND OTHER TOOLS
FOR THE MANUFACTURE OF ALL KINDS OF
SHEET METAL GOODS,
DROP FORGINGS, &c.
Stiles & Parker Press Co.,
MIDDLETON CONN.

NO FLANGED WHEELS.
Warner's Patent
SLIDING
DOOR HANGER,
MANUFACTURED BY
E. C. STEARNS & CO.,
SYRACUSE, N. Y.
SALES OF
CHAS. HUMES & CO.,
ST. LOUIS MO.
1877. - - - 20 SETS.
1881. - - - 500 SETS
Send for Illustrated Catalogue.

BRADLEY'S CUSHIONED HAMMER
STANDS TO-DAY
WITHOUT
AN EQUAL.
Over 800 in use.
It approaches nearer the
action of the smith's arm
than any hammer in the
world.
Bradley & Co.
SYRACUSE, N. Y.
(Established 1832.)

STANLEY G. FLAGG & CO.
PHILADELPHIA, PA.
Office and Works,
N. W. cor. 19th St. & Pennsylvania Ave.
Manufacturers of
STEEL CASTINGS.

A Substitute for Steel & Wrought Forgings.
Circulars sent on application.

Steel Castings.

Light and heavy Steel Castings of superior
metal, solid and homogeneous. All work guaran-
teed. Send for circular.

EUREKA CAST STEEL CO.,
Chester, Pa.
Office: 307 Walnut St., Phila.

"DIETZ"
TUBULAR OIL STOVE
FOR 1883.

**"DIETZ" NO. 0 TUBULAR
REFLECTOR LANTERN,**
WITH DASH ATTACHMENT,
Throws a Powerful Light more than 100 feet.



56 Fulton Street, NEW YORK
25 Lake St., CHICAGO.

TACKLE BLOCKS.

Rope and Iron Strap of all kinds. 1st
quality Wood for Ten-Pin Balls.

Wm. H. McMillan & Bro.,
Offices, 113 South Street, New York
Factory, 32 to 40 Penn St., Brooklyn, N. Y.

COLUMBIA BICYCLES
AND TRICYCLES.

The Popular Rapid
Transit "Steeds"
of To-Day.

The Columbia Bicycles are
too well known to need com-
ment. The Columbia Tri-
cycle is a new machine for
general use by ladies or gen-
tlemen.

Send sc. stamp for 36-page
Illustrated Catalogue, with
price list and full informa-
tion.

THE POPE MFG. CO.,
597 Washington St.,
Boston, Mass.
New York Agency and Riding
School, 214 East 34th St.

THE BEST IN USE.

**DUC'S IMPROVED ELEVATOR
BUCKET**

This is the only scientifically constructed bucket
in the market. It is struck out from charcoal
stamping iron. "No corners to catch," "No
seams to burst." No internal corners to clog
up." It runs with gr. at ease and half the power
of the old style bucket. Will outwear half a
dozen of them. Prices Reduced.

**T. F. ROWLAND, Sole Mfr.,
BROOKLYN, N. Y.**

A. G. PECK & CO.,
Cohoes, N. Y.,
MANUFACTURERS OF
AXES, ADZES,
BROAD AXES,
HATCHETS.

Send for Catalogue and
Price List.

Scranton Brass and File Works.

J. M. EVERHART,
Manufacturer of

BRASS WORK,

For Water, Gas & Steam.
Exhaust Steam Injector, using waste
Steam only, returning it to Boiler
with water at 100 degrees.

Also, PATENT CUT FILES.
SCRANTON, PA.

BLACKSMITH DRILLS.
CLARK SINTZ & CO.
SPRINGFIELD OHIO

RUSSELL, BURDSALL & WARD.

PORTCHESTER, N. Y.,

MANUFACTURERS OF

BOLTS

PLOW,
STOVE, &c.

Carriage Bolts made from Best Square Iron a Specialty.

JOHN RUSSELL CUTLERY CO.,
Green River Works,
MANUFACTURERS OF

Table and Pocket Cutlery,

BUTCHERS', HUNTERS', PAINTERS', DRUGGISTS' & HOUSEHOLD KNIVES
IN ALL STYLES AND VARIETIES.

OLDEST AND LARGEST AMERICAN MANUFACTURERS.

Factories,



Turners Falls, Mass.

F. W. WURSTER,

IRON FOUNDRY
AND AXLE WORKS,

150 to 169 First St.,
Brooklyn, N. Y.

AXLES

SUPERIOR
WAGON, CART AND
CARRIAGE AXLES.

Our facilities enable us to quote the
trade lower prices than any other
manufacturer. Send for price list.

J. M. CARPENTER
PAWTUCKET, R. I.

MANUFACTURER OF TAPS AND DIES.

**"BOYNTON'S" UNRIValed SOLID
STEEL SAW SET.**

The only perfect set known; a blind
man can use it by simply bringing han-
dles together. A perfect gauge, ad-
justable to any thickness, will set
both points of a Lightning Saw instant-
ly, and will set any saw from an or-
dinary hand saw to a 12 gauge mill saw.

10 in. Solid Steel, \$12 per doz.
No. 2 Size \$10 per doz.
25% discount.

"BOYNTON'S PATENT
LIGHTNING SAW SET AND FILE
COMBINED."

5 in., \$2.50. 8 in., \$5.50
10 in., \$6.50.
Less 40% discount.

BOYNTON'S "PATENT LOOP"
Cross Cut Saw Handles.

Per Dozen, 15 Cents Each.
Per 100, Barreled, 12% Cents Each.
Per 1000, Barreled, 10 Cents Each

It has no rival; it is the best,
heaviest, the strongest, and outsells all
others.

E. M. BOYNTON SAW & FILE CO.

54, 58, 62, 40 & 42 DEVON ST.
BROOKLYN.

E. M. BOYNTON,
80 Beekman Street, NEW YORK.

SHEET-IRON BUILDING MATERIALS.

ROOFING.

SIDING.

CEILING.

Patent Cap Seam Roofing, in Four Styles. In Sheets
or Rolls.

Crimped Iron, for Siding or Roofing for Elevators,
Mills and Factories.

Paneled and Crimped Iron Ceiling. Durable, Attra-
ctive, Fire-proof.

Send for Prices and Circulars to

A. NORTHROP & CO., 97 First Ave., PITTSBURGH.

A NY ONE WHO HAS HAD TO LEAN OUT of
a window during a hard rain or a hail storm, to
close a blind that stuck against the side of the house
as if it grew there, and who has said things to that blind
that he afterward regretted, will appreciate the

DOMESTIC BLIND ADJUSTERS.

These fixtures hold Blinds in any position, and re-
quire no Hooks or Catches on the house. They are in-
valuable for Bay Windows.

Send for our Catalogue of the above and of a full
line of SPRING HINGES AND DOOR SPRINGS.

VAN WAGONER & WILLIAMS CO.,

82 Beekman Street, New York.

In was
the e-
of am-
of ste-
ham-
Wyar-
was,
who
iden-
know-
pro-
study
tice a-
none)
rate k-
of the
was e-
reason
the ba-
there
steel b-
metal s-
state o-
ble to
what t-
it wou-
strated
iron s-
our pu-
son o-
perma-
albin-
pariso-
was of
outlay
verter,
runni-
guide i-
materi-
of an
the co-
an ad-
of a th-
of the
labora-
works
knowle-
the con-
approv-
acting
(or wh-
the year
Emile S-
gradua-
chemis-
chemical
ware a-
laborat-
pleted w-
the req-
assisted
party,
Wiscon-
the disc-
ore. O-
(1863),
once pr-
ores he
his ha-
S
Iron...
Oxygen...
Silica...
Magnesi-
Nickel...
Loss...
Mr. S...
investiga-
tion of t-
these pr-
and val-
unstan-
way res-
December
Of Mr. S...
estima-
depart-
scribed
Wyandot
attention
some of
by the p-
about 24
partition
size, wh-
the rear
C, which
door d, a
communi-
end of w-
The ro-
real wor-
tables, t-
and app-
sand-bat-
voir atta-
an abun-
hydrogen
were loc-
vided w-
shelving
metals, a-
above it.
* Read a-
American